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The Colloid Chemistry of Rubber

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LATEX is a complex liquid whose rubber content varies from 30 to 40 per cent or even more in *Hevea brasiliensis* to traces in some other plants. The average in hevea is perhaps 33 to 35 per cent. Except for about 5 per cent the rest is water. This 5 per cent is made up of proteins, resins, quebrachitol, sugars, tannins, alkaloids, enzymes, ferments, and electrolytes; the amount is small, but these ingredients, especially the protein, have a profound influence on the rubber both dispersed as latex and coagulated. A part at least of the protein apparently surrounds the rubber particles and functions as a protective colloid. On coagulation protein-bearing serum separates. The protective action of the protein is different in different plants. Latex from hevea coagulates less easily than that from *Castilloa elastica*. The latter balls up on centrifuging while the former does not. Probably a part of the "nerve" of the dried coagulated rubber is due to the protein.

Changes in the latex begin immediately when it leaves the trees. It is very sensitive to the action of oxygen, heat, light and especially bacteria.

Latex under relatively low magnifying power is shown to be not a real solution but a dispersion. The single particles of the dispersed phase in most latices are in continuous more or less vigorous Brownian movement; the size of particles is different in different latices, they are of different sizes even in the same latex, so we have to do with polydisperse systems. Size varies from ultra-microscopically distinguishable particles to particles with diameters of 15 to 20 μ ; shape from spherical to rod and the particles are partly colloidally dispersed, partly coarsely dispersed. The dispersed phase is mostly only the rubber hydrocarbon, while the other substances are partly truly dissolved and partly colloidally dissolved in the dispersion medium, water.

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¹Z. wiss. Mikros. 29, 1 (1912).

²J. R. J. 68, 19, 725 (1924).

³O. de Vries, Proc. Royal Acad. Amsterdam 26, 9, 10 (1923).

In the particular case of hevea latex on which, of course, the most work has been done, particles vary in size mostly from 0.5 to 3 μ . But there are many smaller than 0.5 μ . And the particles in latex from very young trees and from the green parts of older trees are smaller than those from the older trunks. Most of the particles are not round and the above values refer to the smaller diameter; the larger diameter is 4 to 5 μ , very rarely 6 μ or more. In form the particles are generally pear shaped; some even have more or less well developed tails. Even the ultramicroscopic particles are generally not round,—they show the scintillation phenomenon first pointed out by Siedentopf.¹

Hauser² has shown that the rubber particles consist of at least two phases; an outer nearly solid elastic shell and an inner viscous liquid portion which can actually be removed with the micromanipulator. The shell and the liquid portion are both rubber hydrocarbon of different degrees of polymerization. We have no explanation for this two phase structure of the latex particles. It is unlikely that the rubber hydrocarbon exists in the latex originally in two different forms. It is more probable either that the particles exist in the interior of the latex as a single phase, which is polymerized outside to a solid material, or that the inner part of the globules is a sol whose dispersion medium consists of rubber hydrocarbon while the polymerized form is contained in it as disperse phase. This sol solidifies outside to gel in which the polymerized form predominates. The outer shell is surrounded with an adsorption layer of protein.

It is not easy to say whether latex is simply an emulsion or a suspension.³ It is according to the Freundlich classification a lyophillic colloid with a relatively low degree of solvation (estimated by de Vries at 10 per cent). The particles are negatively charged; they move to the anode when an electric current is passed through latex and are of course coagulated there. They are readily coagulated by acids, while alkalis retard coagulation. Coagulation will take place on the addition of salts; the action of univalent cations is slight, that

RUBBER is a plant product about whose method of formation and whose purpose in the plant economy very little is known. It is obtained in the form of a milky appearing fluid (latex) from a good many different kinds of trees, vines and shrubs growing chiefly in tropical climates. By far the best known of these and at present the principal commercial source is *Hevea brasiliensis*, which is native in the upper reaches of the Amazon River in South America and which has been found to be well adapted to plantation growth. The ornamental house rubber plant is *Ficus elastica*, which grows to immense size in its native habitat (India).

of bivalent cations is greater and that of trivalent cations still greater. The particles may be coagulated by evaporation of the water; also by addition of alcohol if electrolytes are present. Latex will coagulate on standing or on heating, the coagulation being due to putrefaction, bacterial and otherwise, and the increasing formation of acid. It has to be stabilized if it is to be kept for any length of time, and ammonia has been found to be the most efficient and least harmful reagent for this purpose.

The coagulation phenomenon is interesting. De Vries⁴ says that coagulation as applied to latex must be regarded as consisting of two distinct processes, the first a flocculation which follows the usual laws of disperse systems, and the second, called coalescence, which is more or less peculiar to rubber and consists of the cementing together of the particles or flocks to a more or less coherent mass. The two stages overlap in ordinary coagulation but are distinct in special cases. If latex be diluted (1:9 usually) so that it does not coagulate on heating and then heated to 70° or more, the addition of acid gives a floccy separation in a clear serum and these fine flocks do not coalesce; they will remain in that state for days. Coalescence can be brought about by the addition of various agents such as toluene or chloroform, alcohol, thymol or even traces of fresh latex. When latex has been in this flocculated condition for some time, excess of acid does not cause coalescence. Latex coagulates at the isoelectric point of protein. It has been thought, therefore, that the protein in latex is responsible both for the coagulation and for the sticking together of rubber particles, but latex deprived of its protein shows the usual behavior and the rubber particles stick together. The process of coagulation is not reversible—in this respect latex does not resemble the true hydrophylic colloids.

The soft fresh white coagulum if precipitated from undiluted latex has the same volume as the latex; it consists of a net work of about 40 per cent of its weight built up of hydrated rubber particles with the other absorbed substances held by the rubber and such substances as are precipitated from the serum during coagulation. The remaining 60 per cent is serum that is included in this network. The latter is not very plastic, it can be easily molded but it is so strongly built that it keeps its form and behaves like a solid mass. It is not very coherent; it is somewhat brittle and can easily be torn with the hand. The slightest mechanical pressure increases the coherence immensely. It is this property which makes possible the estate practice of crepeing rubber, and also the Emka process.

This structure is important because the fresh coagulum is the first stage in the series of changes that lead from the separate free rubber globules in the latex to the coherent elastic air dried gel that is crude rubber and to vulcanized rubber. Not only does the effect of slight pressure point to a remarkable stickiness or tendency to cohere, but the fact that a colloid with a low degree of solvation (10 per cent estimated) and which forms only 40 per cent of the total gives on coagulation not a precipitate or a granular mass but a gel of greater consistency than even highly solvated gels such as gelatine, points to special cementing forces which deserve attention even if their relation to the consistency of crude or vulcanized rubber should ultimately be found to be remote. As has been mentioned, protein is not this cementing force.

This coagulum is washed and dried to produce the rubber of commerce.

Natural rubber and reclaim may both be dispersed in water if suitable peptizing agents and protective colloids are used together with a proper technique. Masticated natural rubber can be converted into a very good looking artificial latex which has nearly all the properties of natural latex. Dried films obtained from it are much tackier and have less

tensile strength than those obtained from natural latex. The microscopic appearance of the two is of course not the same for most of the original rubber particles are torn and broken during mastication.

Rubber

The dried coagulum is a solid or semi-solid which shows typical swelling phenomena in organic solvents like benzol, gasoline, chloroform, etc. In the swelling medium the rubber swells first to a sort of syrupy mass. Only through mechanical work such as stirring or through preliminary treatment such as mastication or heating does the solution become homogeneous and go into a flowing condition. These solutions are characterized by high viscosity. The swelling power is dependent on a number of factors; on the plant source, on the method of preparation of the rubber, on the solvent, on mechanical working and on additions of other substances. The protein also plays a part, probably. The rubber particles hold the dispersion medium firmly in the solvation sense and the Tyndall phenomenon of the dissolved rubber is not pronounced. The rubber solution shows no syneresis. The rubber may be precipitated by alcohol or acetone. This swelling process is reversible.

On heating rubber gets soft and sticky and then melts. It freezes on slight cooling. It is firm and hard at ordinary temperatures. It shows the Joule effect, becoming warm if stretched, and cool when the stretching force is released. Its "nerve" or elasticity is its most striking property. These properties are greatly changed by kneading or mastication on rolls. At first on mastication rubber becomes firmer and harder, but as the process continues the firmness and hardness decrease, the elasticity disappears and is gradually replaced by an increasing softness. Within certain limits the mastication process is reversible. On standing, if the mastication has not been carried too far, the rubber "recovers" some of its firmness and elasticity. On the other hand it may be "dead-milled" to a soft tacky condition from which it does not recover. Solutions of dead-milled rubber have relatively low viscosity. The rubber is more susceptible to oxidation than properly masticated rubber. Vulcanizates made from it deteriorate faster than those made from properly masticated rubber. The importance of the mastication phenomena will be apparent when it is remembered that nearly all of the mixing and compounding of the rubber industry is at present done by mastication.

Chemically rubber is $(C_5H_8)_n$, n in the smallest molecular units being 6⁵, 8⁶, about 9⁷ (a molecular weight of 600) or 12.⁸ Staudinger's⁹ estimate of the number of (C_5H_8) units in the colloid molecule is 100 or more. Pummerer estimates the molecular weight of the colloidal aggregates to be 30,000 to 50,000, and Staudinger 50,000 to 100,000. There is one double bond for each C_5H_8 group and this is the point of attachment for the substances that combine with rubber hydrocarbon. The evidence favors an open chain arrangement of the C_5H_8 groups.

Rubber is rather resistant to the action of chemical agents, though oxygen, the halogens, hydrohalogens, nitric acid, hot sulphuric acid, trinitrobenzol, ozone and peroxides attack it. Sulphur, sulphur chloride and selenium react with it. The reactions with sulphur and sulphur chloride and the accompanying physical changes have come to be known as vulcanization.

Rubbers from different plant sources differ in regard to their workability on the rolls, in their swelling power in solvents, in their vulcanization capacity and in the properties of their vulcanizates. The substances that naturally accompany rubber, proteins, resins and mineral salts, also play a

⁵Ott, *Naturwissenschaften* 14, 320 (1926).

⁶Hauser and Mark, *Koll. Chem. Beih.* 22, 63; 23, 64 (1926).

⁷Pummerer, *Kautschuk* 1927, 233.

⁸Lindmayer, *Gummi-Ztg.* 40, 2806 (1926); *Caoutchouc et G. P.* 24, 13450 (1927).

⁹Staudinger, *Kautschuk*, Aug., 1925, 7.

⁴"Estate Rubber," Chapter V. See also *I. R. J. Trans.* III, No. 4, pp. 284-297.

chemical or colloid chemical part in these processes but what, is wholly unknown.

Vulcanization

This is the most important reaction for the rubber industry. As mentioned above the term has come to mean the reactions brought about by sulphur (or by sulphur and selenium), hot vulcanization, and by sulphur chloride, cold vulcanization, and the physical changes accompanying the two. Strictly speaking the physical changes due to vulcanization may be brought about in rubber by treating it with trinitrobenzol or with benzoyl peroxide¹⁰ or with ultraviolet light¹¹ or simply with cold alone.¹² But these other processes have no industrial importance.

By hot vulcanization two entirely different products may be obtained which differ chemically so far as we know only in the amount of sulphur they contain. For soft rubbers 5 to 20 per cent of sulphur is mixed with the rubber and for hard rubbers or ebonites from 30 to 40 per cent. Vulcanization times are much longer and temperatures higher for hard rubbers than for soft, the latter seldom running longer than one hour at 140° C. In this process in soft rubbers 1 to 3 per cent of sulphur is "combined" and in hard rubber or ebonite 20 to 30 per cent. The vulcanization coefficients are 1 to 3 and 20 to 30 respectively. The "free" sulphur is relatively easily extractable by solvents, combined sulphur is not, though long continued extraction always yields more sulphur than is "free." Ebonites are hard, rather brittle, and have low stretch, but high tensile. They will take a high polish. They are more resistant to the action of external agents as light, air and heat than soft rubber. Combination of rubber with sulphur does not stop in ebonite at 32 per cent (the figure for complete saturation of the double bonds) but may rise to 40 per cent.¹³ Between 32 and 40 per cent there seems to be a kind of saturated solution which does not give up its sulphur at all or only with difficulty. But for that matter even unvulcanized rubber mixed with sulphur does not give up its sulphur easily; there is a sort of mechanical hindrance that is increased by vulcanization.

A given mixture of rubber and sulphur may be unvulcanized, or over-vulcanized by varying the time of the vulcanization process. Vulcanization is a process in which time is more important than temperature, for it begins at ordinary temperatures, especially if accelerators are added. The attaining of the proper degree of vulcanization does not depend entirely upon the amount of combination between sulphur and rubber hydrocarbon, because the same physical properties will be attained with rubber from different sources with different amounts of combined sulphur. One of the wonders of the vulcanization process anyway is that such a profound effect as vulcanization causes may be attained with so small an amount of agent.

Soft vulcanized rubbers differ from the unvulcanized in being no longer plastic, but elastic; no longer soluble, but insoluble in the so called rubber solvents, which produce only a swelling. Soft vulcanized rubbers cannot be plasticized even on the masticating rolls; they crumble. Ebonites may be ground to dust.

Accelerators only make the theoretical consideration worse. It is possible with them to get optimum vulcanizates using much less sulphur (1 to 2 per cent), and to obtain a given vulcanization grade at lower temperatures and in much less time and with a lower vulcanization coefficient. Besides the mechanical properties and the aging of the vulcanizates are improved. They are hardly catalysts, though used in very small amounts, because they are decomposed during the vulcanization. Probably they activate the sulphur by formation of compounds with it which can transfer this sulphur to the rubber.

Nothing in all this has yet been said about fillers and other compounding agents. As matters of fact it is known that certain materials will impart specific physical properties to rubber and they are added for such purposes. As an instance, gas black imparts a marked stiffness and toughness even to unvulcanized rubber, making it approach vulcanized rubber in some respects. Some of these materials stiffen the vulcanizate, others soften it. The particle size of fillers is of great importance; so is the matter of whether rubber wets the filler or not. But very little is known of the colloid chemical relationships of those materials to rubber.

Cold vulcanization with sulphur chloride is used in the industry in the making of thin rubber goods. By dipping solid rubber for a few seconds in a 1 to 3 per cent solution of sulphur chloride in a rubber swelling medium, e.g., carbon disulphide, benzol or chloroform some swelling occurs and vulcanization takes place. In sulphur chloride vapor vulcanization the situation is not very different. Vulcanization can also be brought about by treating a rubber solution with sulphur chloride. A rise of viscosity or gel-formation with syneresis ensues, the extent of which depends on the concentration of rubber and of sulphur chloride.

Another interesting cold process of vulcanization is that of Peachey,¹⁴ in which solid rubber is treated alternately with sulphur dioxide and hydrogen sulphide gases, or rubber solutions, one containing sulphur dioxide, the other hydrogen sulphide, are mixed. Vulcanization occurs at ordinary temperatures in a short time.

Structure

Many attempts have been made to picture the structure of rubber. They are divided by Bary into four classes: (1) Spheroid hypothesis. (2) Isocolloid hypotheses. (3) Net and cell hypotheses. (4) Solid solution.

1. Of the spheroidal hypotheses one of the oldest is that of Fessenden,¹⁵ who says we have in rubber two substances; one is a little like horn, hard, elastic but possessing very little extensibility; the other is like a very thick molasses or a soft asphalt or stearine pitch. Neither one of these substances having the elasticity of rubber, how can their mixture have this property? Suppose we have a thin sphere of copper filled with water which is practically incompressible; if the diameter of the sphere be 2 cm. and if it be stretched till the long axis of the ellipsoid be 3 cm., the thickness of the wall remaining constant, the surface will be increased 13 per cent which corresponds to a linear extension of the metal of 6 per cent. But in fact there would be a variation in thickness of the metal and the linear extension would be not more than 1.5 per cent for the 50 per cent extension of the sphere. This is an attractive explanation of what happens to rubber under stretch; it explains equally well the Joule effect which may be attributed to the compression and the expansion of the liquid interiors of the spheres. Lunn¹⁶ uses it in explanation of calender grain. When rubber passes between the calender rolls the spheres tend to flatten, but since the movement sideways is restricted by the presence of other spheres the distortion is mainly in the direction of lengthening and thinning the sheet. On release from the pressure of the rolls the spheres will tend to recover their original shape; the lengthened axis will become shorter and the shortened one longer. The first produces the "crawl," or lengthwise shrinkage and the second the thickening of the sheet. The sheet widens because the long axis of the spheres does not recover completely and in becoming as symmetrical as possible the diameter of the spheres in the plane of the sheets is lengthened. Chilling the sheet makes the internal liquid in the spheres so stiff that recovery is slow or prevented. Warming hastens the recovery.

¹⁰J. Russ. Phys. Chem. Soc.; J. R. J. 52, 11, 13, 14 (1916).

¹¹German Patent 262,708 (1912).

¹²Hock and Siedler, *Kautschuk*, Oct., 1925, 10.

¹³R. Weil, *Koll. Z.* 31, 303 (1922).

¹⁴I. R. W. 62, 729 (1920).

¹⁵Science 20, 48 (1892); 21, 113 (1893).

¹⁶I. R. J. 62, 83 (1923).

2. W. Ostwald¹⁷ and Martin Fischer are the chief proponents of the isocolloid hypothesis. They state that "the natural and synthetic rubbers are isocolloids"; in other words they are gels in which the structural elements consist of polymerized molecules in association with simpler molecules of the same chemical composition, for example, polymeric molecules dispersed in a monomeric phase. Natural rubbers are, of course, of a form a little more complex because of the presence in the dispersion of foreign substances such as proteins and resins which are themselves in the dispersed state. This probably too simple constitution does not seem to clear up obscure points in the mechanical properties of rubber. In the application to vulcanization, sulphur is supposed to be fixed by adsorption to the surface of droplets which are supposed to persist in the mass of rubber.

Cheneveau and Heim¹⁸ picture the constitution, at least in the case of vulcanized rubber as consisting of a molecular mass formed of a nucleus of great tenacity and feeble extensibility and a soft envelope of feeble tenacity and great extensibility. But this hypotheses simply puts the elasticity of the total mass for which one is seeking a cause all into the outside envelope.

3. The net and cell hypothesis is an old one, of obscure origin. It accorded to rubber a cellular constitution analogous to that of wood, cotton or vegetable and animal substances in general. Rubber was formerly considered a living substance and consequently as having a cellular constitution. J. Duclaux¹⁹ has succeeded in separating from a solution of rubber left at rest for some years two distinct constituents; one solid, insoluble in the usual rubber solvents, the other liquid or semi-liquid, in much greater quantity than the first. To show how these two constituents can together form rubber with its elastic properties he was led to suppose that the solid part formed a network with close meshes in which was imprisoned the fluid part whose Such a system approaches a cellular system. This is a molecules were too large to go through the enclosing network. sort of reversible gel theory. He thought the cells were filled with a substance which is soluble in the solvent toward which the gel is reversible. The solution can be molecular or more often colloidal but in every case it must be capable of exerting an appreciable osmotic pressure.

This conception is similar to that of Fessenden; the difference is only that the spherical form of the cells is replaced by a volume of form capable of occupying all the space without intercellular spaces (tetrahedron, cube, rhombic dodecahedron, etc.). But none of these hypotheses explains satisfactorily the viscosity and the hysteresis characteristic of rubber.

4. Bary's²⁰ solid solution hypothesis assumes that in a solid highly polymerized rubber hydrocarbon a chemically similar one of a lower degree of polymerization is dissolved. The relation of these two phases to one another is variable and depends on the temperature as well as on mechanical influences; there is in other words, a reversible sol-gel transformation.

The first three classes of hypotheses demand the presence of two phases in the rubber, the last one, however, according to Bary, only one. This is mostly a matter of terminology, for Bary must recognize a heterogeneity in the substance and different polymerization grades may be regarded as independent phases. Bary also comes to the conclusion that the structure of latex has no relation to the structure of rubber.

Recently Klein and Stammberger²¹ have made ultramicro-

scopic observations on benzol solutions of masticated and unmasticated rubber. The former is swellable in benzol without limit, while unmasticated has only a limited swelling capacity. Benzol solutions of unmasticated rubber are nearly clear optically but similar solutions of increasingly masticated rubber give an increasing optical resolution. They assumed that the limited swelling of unmasticated rubber could be compared to the opening of a framework, while in mastication the framework would be torn in all its joints. In the first case the structure would have a refractive index not markedly different from the dissolved substance while the torn parts of the framework dispersed in the solution would give rise to light refraction in the ultra-microscope.

Hock,²² in work on elasticity and the Joule effect, came to the conclusion that we have to do in rubber with the presence of molecules or quasimolecules which have a rod shaped packing and are on stretching extensively oriented into one direction. The elastic properties of rubber as well as the Joule effect he attributes to the van der Waal's cohesion forces brought into play thereby. He sought to give this view thoughtful experimental support. He froze stretched rubber and tore it in this condition; he also hammered it out on an anvil after freezing in liquid air. In both cases the torn and broken places were not smooth, but were unmistakably of the fibrous type.

LeBlanc and Kröger²³ have contributed the following valuable idea in the explanation of the phenomena of mastication and vulcanization. They assume, as Pohle and Staudinger have done, that the individual rubber building blocks under certain conditions aggregate or reaggregate, and under others can disaggregate. On mastication an extensive disaggregation takes place and therewith a loosening of the coagulation framework whereby the elastic properties of the rubber are decreased. On cooling, a reaggregation occurs which causes a new tightening or coarsening of the coagulation framework as a result of which the elastic properties are increased. Vulcanization with sulphur causes finally an extensive reaggregation of the rubber combined with a coarsening of the coagulation framework, so that sulphur has chiefly the property of an accelerator of aggregation. This vulcanization differs from the physical vulcanization (that produced by cold alone) chiefly in its irreversibility. Kröger assumes that vulcanization builds directly upon the aggregation grade of rubber already present and is therefore a strongly accelerated reaction, which is however in its physical results identical with the phenomena that can be obtained with rubber by cooling. It must be assumed that Le Blanc and Kröger regard rubber as a homogeneous substance which becomes heterogeneous first in reaction. In this change two definite well defined phases are not to be distinguished, but rather a continuous change of the polymerization grade.

All these theories are only working hypotheses. They deal with structural elements too large to be answerable for the inner construction of rubber. The first step in the direction of solving this inner structure problem directly was taken by J. R. Katz²⁴, who showed that stretched rubber examined with the X-ray, gave definite interference phenomena. Katz and Bing showed that unstretched raw rubber gives with X-ray only a hazy ring and so must be regarded as amorphous. But already at 80 per cent stretch there are signs of X-ray interferences which increase with increasing stretch till finally at 400 per cent and more a brilliant fiber diagram is given. In analogy to other substances Katz has designated stretched rubber as crystalline and rubber itself as pseudoamorphous-crystalline. On warming the rubber the interferences disappear. Vulcanized rubber shows

¹⁷"Die Welt der Vernachlässigten Dimensionen," 8th edition, p. 185 (Dresden, 1922).

¹⁸Compt. rend. 152, 320 (1911).

¹⁹Rev. Gen. Coll. 1, 33 (1923).

²⁰Rev. Gen. Coll. 3, 225, 263 (1925).

²¹Koll. Z. 35, 362 (1924).

²²Koll. Z. 35, 42 (1924).

²³Koll. Z. 37, 205 (1925); also Kröger, Gummi-Ztg. 40, 25, 782, 1803, 2373, 2429 (1926).

²⁴Koll. Z. 36, 300; 37, 19 (1925); Gummi-Ztg. 39, 1044, 2351 (1925); Naturwiss., 30, 410 (1925).

the interferences but they are weaker than in the unvulcanized material. Hauser and Mark²⁵ have found that the position of the interferences does not change from the moment of their appearance at 80 per cent stretch to the maximum possible stretch of about 1,000 per cent, or even racked to 10,000 per cent, but the intensity of the interferences increases proportionally to the stretch. The position of the amorphous ring remains also unchanged during stretch, but its intensity decreases with the increased stretch. It must be assumed that there is in the unstretched material an amorphous or liquid phase, which in stretching goes partly over into a crystalline condition or one very similar to it. Since the position of the interferences, which is closely related to the size of the elements of the lattice, does not change, the contention is justified that the interferences are due to the presence of a defined space lattice, all the more since those elementary substances always contain a whole number of molecules. From the fact that the "half width" of the interference flecks does not change in increasing stretch, Hauser and Mark conclude that a continuous appearance of new crystal individuals occurs during the stretching. Rubber twisted, stretched in two directions, or stretched evenly in all directions in a plane, gives the diagram it would be expected to give from this crystallographic structure theory. For instance, rubber stretched in all directions in a plane gives a ring fiber diagram, and twisted rubber gives a distinct spiral fiber diagram. With weakly and medium stretched rubber diagrams the crystal is a rhombic-quadratic form whose a-axis is determined by the Polanyi lattice-distance relationship to be 7.68 Å, while the other two are 8.0 and 8.6 Å respectively. With strongly stretched samples the interference points demand the assumption of an elementary substance with a doubled a-axis. Such an elementary substance has the formula $(C_5H_8)_s$.

The "angular width" of the observed flecks bears a definite relationship to the number of the atoms which must be united into a molecular group, while the position of the interferences has a relation to the inner structure of these groups. From these the assumptions are justified that the molecule groups which cause the interferences contain some 2,000 to 4,000 $(C_5H_8)_s$ molecules and that their relative positions correspond to a space lattice.

The interferences diminish with rising temperature, to disappear at 60° C. They disappear also in rubber left in the stretched condition, also in swollen or masticated rubber. If stretched rubber be cooled, the interferences are preserved undiminished. Stretching at low temperatures gives weakened interferences in the normal positions. Rubber frozen and unstretched gives the hazy amorphous ring, while rubber hardened by long exposure gives a marked Debye-Scherrer diagram which goes over into the normal point diagram on stretching.

On this basis Hauser and Mark assume that in rubber molecular aggregates of certain size are preformed, which however give no occasion for sharp interference phenomena because they are in a condition corresponding to a strongly warmed crystal lattice. They assume that the molecular aggregates in unstretched rubber are in a swollen condition, so that the amplitude of the single lattice points is so great that intensive interferences cannot arise. By unequal stresses a partial deswelling is caused whereby the inner order and the intensity of the interferences increase. But the position of the interferences is even as in the warmed crystal independent of the grade of swelling. The elasticity of rubber has a relationship with a swelling equilibrium and the Joule effect is due simply to heat of compression of the swollen rubber aggregates.

The Hauser-Mark hypothesis belongs without question to the group of one phase theories in the meaning of Bary's terminology. Our present knowledge of the inner structure

of rubber can perhaps best be expressed in the statement that we have to do in rubber with a quasihomogeneous substance, which contains one hydrocarbon in at least two different polymerization grades, of which the higher polymerized portion is present in a crystalline or at least very similar condition.

There is no general agreement as to a theory of vulcanization. We know that heating rubber with sulphur and with some other things, produces certain physical changes in the rubber, which changes vastly increase the usefulness of this substance. It is made stronger and more elastic, tougher, and its softening and freezing points are moved much farther apart. It also ages better.

When heated with sulphur a portion of the sulphur is always "combined" and this cannot be removed as elemental sulphur. Long continued extraction with sulphur solvents continues to extract sulphur from vulcanized rubber, but it may well come from decomposition products of some sort. For a given mixture the properties of the vulcanizate will depend on the amount of combination, and the time and the temperature of heating. But the same amount of combined sulphur may not produce the same results in another mixture.

There are undoubtedly three phenomena in hot vulcanization with sulphur: (1) union of rubber with sulphur; (2) aggregation of rubber particles and; (3) disaggregation due to heat. Sulphur is here a necessary agent for producing aggregation and there is always some combination of rubber and sulphur. The latter reaction is not a secondary one; it may be even a determinant factor. Hot vulcanization may be regarded as a race between the building up process of aggregation helped by sulphur and the disaggregating process caused by heat. But whether some sulphur is united to every hydrocarbon group or only to some is not known. Vulcanized rubber is certainly no common mixture of raw rubber and rubber sulphide, yet mixtures of vulcanized latex and raw latex, or rubber solution in benzol with rubber vulcanized with sulphur chloride can be made from which a product can be obtained similar to vulcanized rubber with the equivalent amount of combined sulphur.

Some regard vulcanization as a purely chemical process.²⁶ Others regard it as a colloid chemical process of adsorption.²⁷ and others as a combination of both. Some recent investigators regard it as a purely physical process (LeBlanc and Kröger²⁸ and Maximoff²⁹). The latter thinks that rubber consists of a soluble solid continuous phase and a liquid disperse phase. When rubber is vulcanized this soluble solid phase is converted into an insoluble one and this accounts for all the differences between raw and vulcanized rubber.

²⁶Weber, "Chemistry of Rubber," p. 92.

²⁷Koll. Z. 6, 136 (1910).

²⁸Loc. Cit.

²⁹Caoutchouc et G. P. 24, 13582 (1927).

Good Containers Spur Sales

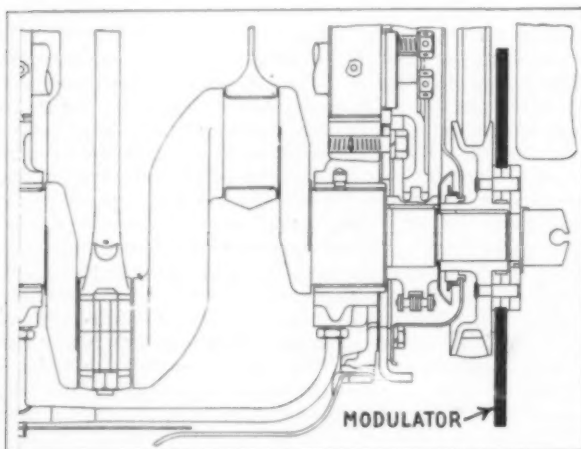
That American rubber manufacturers make no mistake in encasing their products in substantial and attractive containers, is the opinion of British merchandising managers. "The reason why higher-priced goods from the United States continue to oversell British makes," it is remarked, "is that American manufacturers are paying more and more for their boxes and display cartons. Enemas, hygienic syringes, water bottles, even garden hose, reach the consumer in better condition after journeys of many thousands of miles than when, as in some instances, the distance is a mere two hours' rail ride. Furthermore, giant display cards and luxurious show cards carry irresistible weight with buyers, and suggestions are made that British makers miscalculate their real cost. A show card that costs a shilling per dozen articles adds this cost to the primary order only. The inevitable "repeats" makes the ultimate cost of display negligible."

²⁵Koll. Chem. Beih. 22, 63; 23, 64 (1926); Gummi-Ztg. 40, 2090 (1926).

Rubber Dampens Crank Shaft Vibrations

High Frequency Oscillating Modulator

THE problem of how to effectually dampen the vibrations of modern high speed engines has been uppermost in the minds of many engineers for a number of years and is the object of much research. In particular, attempts have been made to damp out vibration caused by the periodic twist or torsion in crank shafts. This vibration is one of the most disturbing of all types coming from the power plant of the modern motor car. It has been proved conclusively, in fact, that torsional vibration is one of the greatest factors militating against smooth operation of a gasoline engine. These vibrations have been very carefully recorded, both as to their periodicity and amplitude, but not until the development of the high frequency oscillating modulator here

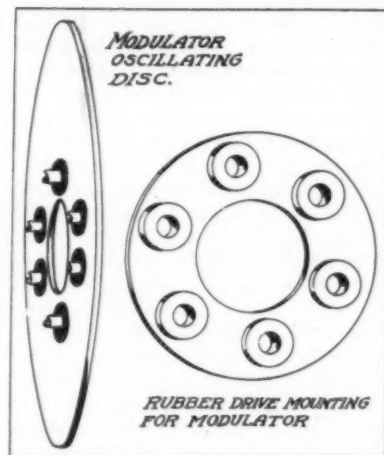


referred to have vibrations from this source been thoroughly dampened.

The devices formerly designed for this purpose usually consisted of comparatively heavy fly wheels mounted at the front end of the crank shaft and driven by friction disks. Investigation of these devices has proved them very erratic in action. A distinct roughness of operation due to torsional vibration is observable, as the speed and power of automobile engines have increased, consequently the urgency of finding an effective remedy for this condition became increasingly important.

Research along this line finally resulted in the development of the simple construction designated as a "High-frequency Oscillating Modulator." This new form of vibration dampener consists of a relatively light stamped steel disk accurately balanced and mounted on specially prepared rubber disks, all of which rotate at high speed at the front end of the motor car crank shaft. The parts of the device are pictured in the accompanying illustrations, one representing the rubber drive mounting for the modulator and the modulator oscillating steel disk. The other view is a sectional drawing showing the assembly of the modulator as attached to the crank shaft.

The modulator is remarkable for simplicity of construction and action. It operates on an entirely different principle from the friction type and requires a surprisingly small weight to function, as only sufficient mass is necessary to



obtain the same frequency of vibration as that of the crank shaft itself.

The steel disk weighs but a slight fraction of the shaft and is so nicely balanced that, at the first indication of vibration through the crank shaft, the modulator starts oscillating at high frequency, building up and counteracting vibrations before they reach annoying proportions. This effect recurs at regular intervals throughout the speed range.

As the oscillating disk is mounted and cushioned in rubber its operation is not affected by atmospheric or temperature changes. The rubber employed for mounting the disk is particularly high grade live rubber. Most important of all this modulator is more than a single purpose device since it counteracts more than one period. The reason for this is that some of these periods are so slight as to be scarcely detected, yet these, as well as the greater ones, are also damped out.

The dependence of this device on the functioning of its rubber for its effectiveness serves as another of the frequent reminders of the adaptability of rubber in perfecting automotive development.

Rubber Statistical Service

RESTRICTION on the exportation of crude rubber from the British controlled plantations was removed on November 1, 1928. Then for the first time in six years the crude rubber market became free to find its economic level.

For the study and interpretation of the producing and consuming rubber market, a competent and experienced statistical organization has been formed, by Henderson Rubber Reports, Inc., 44 Beaver St., New York, N. Y. The service is the natural outgrowth of that provided for many years by F. R. Henderson, president of the Rubber Exchange of New York, for a small group of rubber specialists. This unique information service covering rubber in all its phases is based on expert research and personal contacts in Europe and the Far East. Its scope is now to be broadened, a greater fund of information included and the service offered to the public generally. The plan, in outline, provides knowledge of the factors that determine prices through the means of weekly, monthly and quarterly reports with the whole story, past and present, clearly analyzed, condensed and conveniently compared in charts showing current conditions of stocks, prices, consumption, and turnover. The service includes a basic study in charts covering annual production of automobiles and tires, relation of reclaimed rubber consumption to crude rubber prices, world exports of rubber, trends of production and prices of rubber, cotton, etc.

NOTE—Invention of Thomas J. Little, Jr., chief engineer Marmon Motor Car Co., Indianapolis, Ind.

The History of Elastic Fabrics

ELASTIC fabrics have been known

for a long time and have been used chiefly in wearing apparel. The oldest type consisted of a loosely woven or braided fabric which could be easily stretched in any direction. This type is not satisfactory where the fabric is subjected to varying stresses at frequent intervals and where it must retain its initial elasticity for a long time as in a garter. The problem was solved by employing rubber which is resilient and can withstand stretching for a long time without losing its elasticity.

Types of Elastic Fabrics

Rubber has been combined in various ways with textile materials producing distinct types of elastic fabrics. In one variety the compound fabric constituting the elastic cloth is formed by applying a textile material woven of warp threads and weft threads to strands or strips of rubber, previously stretched, so that the rubber strands extend in the same direction in the fabric as a portion of the threads of the textile material. After the combination of the rubber and textile material has thus been made, the rubber is permitted to contract, and as the rubber threads were extended in the same direction as some of the threads of the textile material, the contraction causes the textile material to gather up in waves or corrugations, which are more or less apparent according to the manner in which the goods have been formed. This fabric is disclosed in patent No. 3,461 granted to Charles Goodyear in 1844. He also devised a machine for manufacturing this fabric.

Elastic cloth has been also made either directly by interweaving the threads of textile material upon threads or strips of rubber in an extended state, or indirectly by weaving the textile material separately and afterward effecting the combination with the extended rubber threads by means of cement. This compound fabric, whichever way it may be made, although it can be manufactured at a low rate on account of the facility with which textile material can be woven, is objectionable on account of the gathering up or corrugation of the textile material; hence elastic cloth has been invented in which the textile material consists of a looped fabric formed in a knitting machine. This, however, is objectionable on account of its surface, which being formed by the looped fabric, is not suitable to many purposes to which elastic cloth is applied in the arts. An attempt has also been made to form the compound fabric by combining rubber threads with a textile material by means of a twisted-lace loom, but the elastic cloth so produced is expensive and objectionable on account of the openness of the fabric.

Another type of elastic cloth is made by preparing sheets of bias-cut fabric by cutting a tubular cloth spirally and combining them with a layer of rubber between them as in patent No. 33,361.

In patent No. 5,908 a woven fabric is stretched so that its warp threads are extended at an acute angle with the weft threads and combined with rubber to retain the fabric in this condition. This fabric is elastic only in a direction diagonal to its warp and weft threads.

Another type of elastic fabric consists of a sheet of perforated rubber cemented between two layers of knit fabric, patent No. 11,716.

A Brief Description of the Various Types and a Review of the Patents Relating to Elastic Fabrics and Their Manufacture

JOSEPH ROSSMAN

Instead of using strips of rubber between fabric sheets patent No. 25,180 unites two sheets of fabric with a layer of rubber and then passes the assembled layers between a fluted roller and a plain roller thus producing an elastic fabric having strands of connected rubber between them.

Other materials besides the usual fabrics have been used to make elastic fabrics. In patent No. 286,037 two sheets of leather are cemented with tensioned rubber threads between them producing an elastic goring for boots or shoes.

United States Patents

The following are abstracts of the United States patents on elastic fabrics:

1. Goodyear, 3,461. Mar. 9, 1844. A plurality of narrow, parallel strips of rubber are stretched and covered on each side with a layer of cloth by means of rubber cement. Any desired material such as silk, cotton or leather may be used. This elastic fabric when dry may be cut into any desired width. In patent No. 3,462, Mar. 9, 1844, a machine is disclosed for making this fabric.

2. Day, 3,788. Oct. 12, 1844. A machine for making elastic fabric made of two layers of fabric having stretched rubber bands between them. The rubber bands are stretched at the point where they are incorporated between the layers.

3. Goodyear, 4,099. July 5, 1845. An elastic fabric consisting of stocking-knit fabric and rubber. The rubber may be applied between two layers of the fabric or applied only to the exterior surface of the fabric.

4. Solis, 5,908. Nov. 7, 1848. An elastic cloth is made by preparing a woven textile cloth having the threads of the warp oblique to the weft and combining it with rubber strips or a rubber sheet in normal condition. A second piece of similarly prepared cloth is laid over the rubber in such manner that its threads extend in the same direction with the threads of the first sheet. The whole is then pressed together.

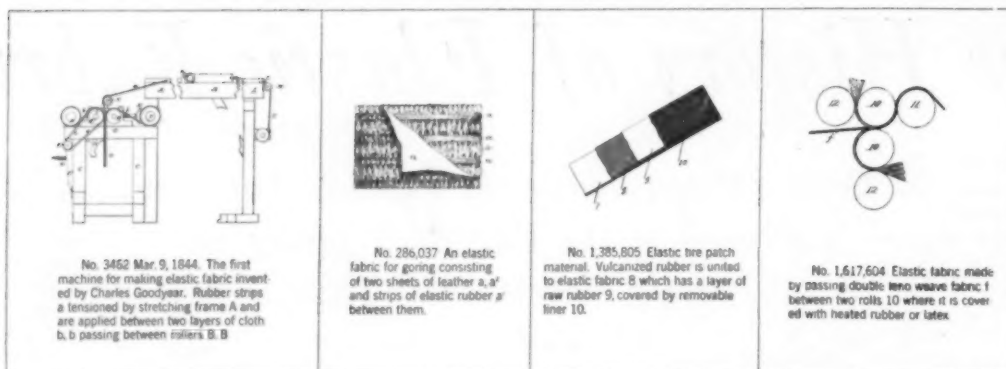
5. Brown, 11,716. Sept. 26, 1854. A sheet of perforated rubber or strips of rubber cemented between two layers of knitted fabric.

6. Tyler and Helm, 14,814. May 6, 1856. An elastic fabric composed of two pieces of cloth, either woven with the threads of the weft in a diagonal position to the threads of the warp, or of common cloth stretched so as to force the threads in such relative diagonal position, combined and caused to adhere together exclusively by a vulcanized compound of rubber or gutta percha, the two pieces of cloth being first united by the vulcanizable compound and the compound being vulcanized after the union.

7. Millard, 16,601. Feb. 10, 1857. A sheet of vulcanized rubber is buffed, then stretched and cemented between two sheets of cloth forming an elastic fabric.

8. Winslow, 17,950. Aug. 4, 1857. An elastic cloth made of a fabric composed of rubber or gutta percha cement and two pieces of cloth in which the warp and weft of each piece are made to cross one another diagonally or at acute angles with the edges of the cloth cut and overlapped in lines parallel or approximately so to the weft, and at acute angles with the warp threads and cemented down to the fabric.

9. Day, 25,180. Aug. 23, 1859. The method of manu-



facturing elastic cloth which consists in spreading rubber between two sheets of fabric and passing the fabric between a plain and fluted roller so as to produce a series of ribs or strands of rubber between the fabric layers. The cloth is then vulcanized. The fabric is claimed in patent No. 25,249.

10. Solis, 30,891. Dec. 11, 1860. A machine for making elastic fabric. The rubber bands are passed through a toothed guide about the guide roller and then applied between two layers of fabric.

11. Solis, 31,832. Mar. 26, 1861. A machine for making elastic fabric consisting of two sources of fabric supply and a supply of rubber cords. The fabric sheets are passed between a yielding and a grooved roller and the rubber cords are led between the fabric sheets as they pass through the rollers. The fabric sheets are united and crimped in one operation.

12. Newell, 33,361. Sept. 24, 1861. Tubular cloth is cut spirally and two of these prepared sheets are united by rubber and vulcanized. The two sheets of cloth may be stretched lengthwise before they are united with the rubber.

13. Haskins, 82,944. Oct. 13, 1868. A goring for shoes made of perforated rubber sheets having marginal stays of cloth.

14. Winslow, 124,527. Mar. 12, 1872. Elastic goring for boots and shoes, consisting of two surfaces of elastic fabric having an elastic material introduced between the two edges, and their meeting surfaces coated with a rubber compound, and the article completed by vulcanization.

15. Winslow, 136,119. Feb. 18, 1873. Goring consisting of the outer and inner fabric, with the vulcanized strands or sheets of rubber between, and a stay of nonelastic material inserted between the edges of the two fabrics.

16. Blanchard, 167,732. Sept. 14, 1875. An elastic goring consisting of a rubber thread and a sheet of material united by a sewing thread.

17. Bowra, 196,871. Nov. 6, 1877. The manufacture of compound elastic fabrics by combining strips of cloth obtained from attenuated knitted or woven fabrics with strips of sheet rubber, and while the latter are held in tension, shrinking the same on a heated plate.

18. Mayall, 286,037. Oct. 2, 1883. An elastic fabric for goring consisting of two sheets of pliable leather cemented together and inclosing between them parallel strips of rubber secured between said sheets while stretched to their utmost tension so that when relaxed they will crimp the leather sheets in one direction.

19. Kayser, 375,073. Dec. 20, 1887. An elastic fabric consisting of a sheet of knitted fabric and a sheet of perforated rubber united together.

20. Straus, 526,546. Sept. 25, 1894. The method of making an elastic fabric which consists in incorporating rubber with a bias cut woven fabric then stretching the fabric diagonally in one direction, and fixing the same in such condition by vulcanizing the rubber, incorporated therewith.

21. Plechner, 554,535. Feb. 11, 1896. The process of producing a textile fabric which consists in spreading out a ply or piece of fabric in a flat condition, applying to said piece a cement or adhesive, applying a second ply or piece to the first ply or piece so as to cause the two to adhere, and then crimping the plies, suitable elastics in unstretched condition having been interposed between the plies prior to their being secured or cemented together.

22. Ziegler, 563,001. June 30, 1896. Strips of rubber are vulcanized to a sheet of canvas. Narrow strips are then cut from this sheet giving a strip of alternating elastic and nonelastic portions. The separate strips are covered with a braided jacket.

23. Riley, 630,110. Aug. 1, 1899. A knit fabric having elastic threads cemented to the material thereof.

24. Strauss, 952,849. Mar. 22, 1910. A composite fabric consisting of a strip of fabric material, a strip of elastic material thereon and of lesser width than the first strip, and elastic strings spaced apart from the edges of the elastic strip and substantially parallel with the edges, the edges of first named strip being folded over on the strings, a strip of fabric material on the elastic strip, which is of greater width than the elastic strip and of lesser width than the first named strip and secured to the turned over edges thereof.

25. Carter, 963,744. July 12, 1910. A knitted fabric having a rubber strand extending to and from upon one face of the fabric in substantial parallelism to the courses thereof only, and secured thereto by sewed stitches elastic longitudinally of said courses.

26. Hopkins, 1,019,473. Mar. 5, 1912. An elastic fabric made of nonelastic threads and rubber threads.

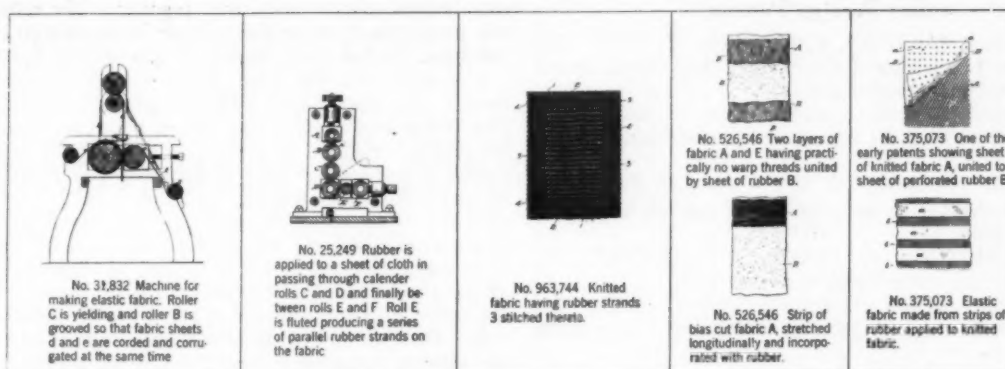
27. Scheuer, 1,183,037. May 16, 1916. An elastic leather composed of a layer of elastic webbing material impregnated with a size and attached under tension to a facing of sized leather also under tension.

28. Scheuer, 1,186,613. June 13, 1916. Stretchable material composed of a sheet of corrugated fabric, a layer of rubber cement on one side thereof filling the corrugations and a sheet of elastic material secured thereto on the coated side.

29. Geiger, 1,211,696. Jan. 9, 1917. An elastic strip consisting of a coil of spring wire having its coils flattened and elongated, and plies of nonelastic fabric between which the flattened coils are stitched while elongated, the coils being adapted to contract and gather the plies of fabric.

30. Squires, 1,220,372. Mar. 27, 1917. An elastic fabric woven with rubber and textile warp threads and textile weft threads, and having a surface coating of pure rubber vulcanized thereon.

31. Jacobs, 1,288,601. Dec. 24, 1918. The process of making an elastic body belting web which consists in cementing a stretched elastic web in a casing of flexible material, crimping the casing and its contained elastic web in a direc-



tion transverse to the direction in which the elastic web is stretched and while the web is under tension, and subsequently releasing the elastic web from its tension whereby the casing is contracted in length.

32. Scheuer, 1,302,473. Apr. 29, 1919. Stretchable, laminated leather fabric composed of a sheet of smooth, uncorrugated leather cemented to a piece of elastic webbing, the leather having a greater capacity for stretching than the webbing, while the webbing is in normal condition.

33. Voorhees, 1,385,805. July 26, 1921. A material for the production of repair patches for pneumatic tires and the like, consisting of a layer of vulcanized rubber, a layer of elastic fabric vulcanized thereto, and a layer of unvulcanized rubber permanently united to the fabric, said material being stretchable longitudinally and transversely.

34. Guinzburg, 1,462,279. July 17, 1923. An article comprising a strip of gathered or shirred textile fabric having a plurality of spaced narrow strips of elastic secured to it by stitching, some of the strips being secured on one face of the fabric and a strip on the opposite face thereof, two of the strips constituting flat, unshirred elastic strips at the opposite longitudinal edges of the fabric strip, and over stitching enclosing the edge strips to secure the same to one face of the fabric strip and to provide a reinforcement for the edges of the fabric strip.

35. Moore, 1,490,535. Apr. 15, 1924. An elastic open weave fabric having elastic warp cords.

36. Heintz, 1,508,321. Sept. 9, 1924. An elastic webbing consisting of a resilient wire covered with a tubular nonelastic covering.

37. Kops, 1,538,826. May 19, 1925. An elastic webbing having an elastic section and an inelastic section composed of strips of material each comprising an elastic sheet and a fabric secured thereto, an inelastic fabric member in the inelastic section of the webbing, and lines of stitching connecting the edges of the strips of material and the inelastic fabric member.

38. Turner, 1,616,009. Feb. 1, 1927. An elastic strap for use as shirring for door pockets, comprising a stretchable band of rubber, and tabs of fabric vulcanized to the respective ends of the band and extending beyond the band of rubber to act as attaching means.

39. Hirsch, 1,662,609. Feb. 1, 1927. In an elastic webbing, inelastic warp and weft threads, and a plurality of elastic threads each comprising a core and a cover thread having knots therein at relatively close intervals.

40. Mills, 1,617,604. Feb. 15, 1927. The method consists in producing a loose textile fabric having elastic threads extending in one direction to give it elasticity in that direction, stretching the fabric longitudinally to a degree materially less than its elastic limit, and applying rubber to the fabric and

subjecting it to a high degree of pressure and temperature to vulcanize the rubber in position on the fabric and through it.

41. Martin, 1,620,162. March 8, 1927. An elastic strapping for embodiment in articles of personal wear comprising a body portion of elastic webbing, front and back coverings of fabric and leather secured to opposite sides of the elastic webbing by adhesive and to one another at opposite margins of the elastic webbing by adhesive, the front and back coverings in contact with the elastic webbing having relatively fine corrugations or wrinkles due to contraction of webbing and having relatively deeper and coarser ruffles throughout a substantial width beyond the elastic webbing due to contraction thereof.

British Patents

42. Green, 449 of 1854. An elastic fabric consisting of leather and a woven fabric, or two woven fabrics united by a solution of rubber and having between them stretched strands of caoutchouc.

43. Hodges, 384 of 1857. Two elastic materials are united by a solution of caoutchouc.

44. Bowra, 2,779 of 1861. Elastic fabrics are united by rubber and perforated by pins or needles for ventilation purposes.

45. Hunt, 2,471 of 1868. A finely perforated rubber sheet is united to a backing of silk, cotton or wool.

46. Turner, 3,418 of 1872. A compound fabric consisting of a silk face and a cotton back is attached to a sheet of rubber in stretched condition.

47. Parry, 11,155 of 1885. Silk, wool or cotton fabric is stitched to an elastic material while the latter is held under tension.

48. Desprez, 23,028 of 1893. Sheets of gutta percha covered on one or both sides with a textile fabric.

49. Tebbutt, 27,797 of 1897. Rubber strips of varying widths are applied under tension between two sheets of fabric.

50. Kops, 233,224. May 7, 1925. A sheet of perforated rubber covered on one or both sides with a layer of knitted silk fabric.

French Patents

51. Vencay, 375,885. May 27, 1907. A felt sheet having incorporated rubber strands.

52. Baumgarten, 427,079. May 19, 1911. Two layers of fabric united by rubber threads.

53. Faure-Roux, 462,657. Nov. 27, 1913. Rubber threads covered with a cotton or artificial silk fabric.

54. Bertheas, 625,170. April 17, 1927. An elastic fabric made of rubber threads and threads of silk or cotton.

Other Foreign Patents

55. Hoffman (Austrian), 6,867. Feb. 25, 1902. An elastic material consisting of a perforated sheet of vulcanized fiber embedded in a sheet of rubber.

56. Schurns (Austrian), 44,188. Sept. 26, 1910. Silk, wool or other fabrics are united with rubber bands under tension.

57. Nachf (German), 267,419. Mar. 29, 1913. An elastic fabric having an inelastic central portion formed by rows of stitching.

58. Schmidt (German), 299,458. July 16, 1917. An elastic spring coil covered with a woven fabric.

59. Muller, 311,068 (German). Feb. 22, 1919. An elastic fabric having straight and undulating rubber cords secured thereto.

Need of Uniform

Fabric Specifications

In the Proofing Industry¹

S. G. BYAM²

THE remarkable growth in the rubberizing industry hinges upon the raincoat and sport coat business, and is due to better and more attractive rubber coatings, to up-to-date and modish styling of garments, and to suitable fabrics. In considering these three factors, on which the rubber clothing industry depends, rubberizers can control the application of rubber to the fabric, and exert as much influence as possible on the apparel manufacturers by attempting to guide their style trends in order to produce for them the attractively colored long wearing materials they use. The third factor belongs to the textile people, and rubberizers are now getting help from the interested trade groups by suggesting through proposed specifications the necessary requirements and reasons for them.

The years 1921-1924 were rather transition years in the rubber proofing business and in the raincoat line the war time double texture coat had passed. It was followed by a cloth surface, rubber-lined material known as gas mask fabric in the trade. This material made an attractive and serviceable coat—if the fabric used was strong enough. The material weighed when finished around 24 ounces per square yard while the fabric commonly used was 5:35 64 by 60 print cloth weighing only three ounces. Although the gas mask coat had a somewhat substantial wave of popularity for a couple of years, it could not really become acceptable with the public because of the ease with which it tore. It was decidedly a mistake to use so light a fabric in so heavy a garment. Rubberizers should never have permitted such a fabric to be used so extensively, though of course price always looms up as a big argument.

Gas mask fabric was followed by the very light weight, high colored, rubber surfaced material made on 5:35 Bombay. On this was put a 4 ounce coating, producing an excellent attractive light weight, low price fabric. The proof of the wisdom of changing to this type is given in the very much increased production that resulted, and is evidenced by the increased yardage of 1925 and 1926. Of course, the Bombay coats were made chiefly for women and girls and had the popular appeal of color. From bombazine was evolved leatherette, a shiny finished highly colored rubber surface material on a napped sheeting or flannel. This material was somewhat heavier than its predecessor, more attractive in appearance and was also stronger and more serviceable. The resulting coats were styled better and at

once became tremendously more popular. The reflection of this popularity shows in the increase in the amount of fabric consumed during 1927 of over twenty million yards.

It can be seen that 1928 is also a leatherette year, even though estimates indicate a two million falling off this year. The interesting question now is one of great importance to the textile industry. It is what will be popular next year? Usually it seems to be the case that there is a secondary type of material being consumed every year which bids fair to predominate in one of the years immediately following that of a popular number. The double texture of war time never went completely out of existence and has been a back log of some importance during the past eight years. This year the use of double textures increased with the popular trench coat. Does the falling off of leatherette by ten per cent and the increase in double texture of nearly one hundred per cent over 1927 indicate the supplanting of the former by the latter? Possibly it does. It is believed that leatherette will be popular another year but that double textures will continue to increase also.

Although principally discussing the needs of the proofing industry it is well to mention the allied business of rubberized automobile topping. This business is specialized and is of such size that it has seemed desirable to classify it separately from proofing, and accordingly it cooperates under its own division of the Rubber Association of America. It uses chiefly 60-inch wide fabrics such as drills, sheetings, whipcords, teals, sateens, etc. It consumed in 1927, 13,511,340 lineal yards of fabrics, equivalent to nearly 20,000,000 square yards of fabric. There is a tendency now on the part of the automobile industry to use narrower goods and it looks as though most of the 1929 requirements may be for 45 inch finished material. This, of course, represents a loss in yardage to the textile industry and to the automobile topping manufacturers. Lineal yardage will remain up but the dollar value of sales will be less.

The general requirements for fabrics for this business are similar to those for general proofing, and it is hoped eventually to offer standard specifications for them.

A product allied to rubberized fabrics is pyroxylin coated material, used for auto topping, upholstery and many special articles. This industry has problems similar in many respects to rubber proofing with regard to fabric requirements. In 1927 pyroxylin coated manufacturers used nearly 33,000,000 yards of fabrics and in 1928 will probably consume nearly 40,000,000 yards. Other coated textile industries like oil cloth and tarpaulin use much material though we have no figures available regarding them. It is apparent, however, that the textile industry sells a tremendous yardage to the coating manufacturers and that it is highly desirable to know as much as possible about the special requirements of the various groups.

Pitchy Felt and Rubber Flooring

A new type of rubber flooring having a pitchy or a bituminized felt backing, instead of a rubberized fabric, vulcanized to the rubber tread sheet is claimed by the inventor to not only lie smoothly on a floor and to absorb nail heads or other small projections without distorting the surface, but is capable of being more securely affixed to a floor through the required use of a gasoline or like volatile cement. The latter, it is claimed, is superior to the much used water-miscible cements, the pitchy content assuring firm, moisture-proof attachment to the underlying wood or concrete and the solvent drying before the sheeted material can be deformed through curling. Although a rubber solvent, the gasoline as thus used does not act on the rubber sheet vulcanized to the bituminized felt backing, but only on the latter; and while fastening the material to the floor it also seals the joined edges through welding the bituminous composition used in the backing.—U. S. patent No. 1,677,284.

¹ Paper presented before the American Society of Textile Chemists and Colorists meeting in Providence, R. I., Dec. 8, 1928.

² E. I. duPont de Nemours & Co., Fairfield, Conn.

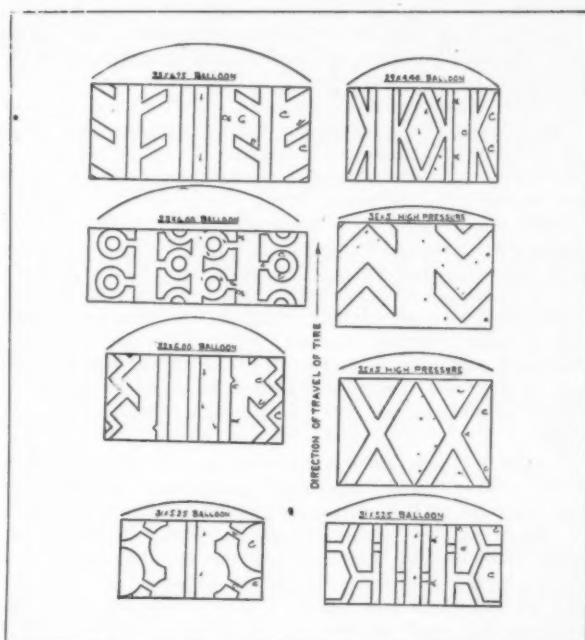
Tread Movement of Pneumatic Tires¹

W. L. HOLT AND C. M. COOK

IN this investigation a study of the manner in which pneumatic tire treads wear has been made by observing the movement of the tread when in contact with a flat surface. The matter of tread wear has come very much to the front since the general adoption of the balloon tire, which, because of its greater deflection and larger tread contact area, presents a more serious problem in this respect than the high pressure tire. Under normal conditions a tire should be expected to wear uniformly and symmetrically around its periphery, but it is a matter of general observation that treads do not wear that way. Some of the common ways of wearing non-uniformly are "cupping" of treads on each side of the center line, wearing of the edges of the buttions, and nonsymmetrical wear with respect to the center line of the tire. Accordingly a study of the way in which treads are abraided should yield valuable information concerning the causes of tread wear, and thus indicate the most economical use of rubber in the tread.

Tread movements were observed and recorded by several different methods. In one an apparatus was used by which a tire could be pressed against and rolled along a heavy glass plate, through which the tread movement could be observed. This is shown in Figure 1. The tire is mounted on the shaft of the motor simply for convenience, as the motor itself is not used. A loading device permits the tire to be pressed against the plate glass, which is secured to a small carriage. The carriage can be moved up and down by turning the handle which operates through a rack and pinion. Thus the action of a tire in rolling along a flat surface is simulated. The glass plate is ruled and etched in 1-inch squares as reference lines. It would probably be desirable to subdivide these into one-tenth inch over at least the central

¹"Measurement of the Tread Movement of Pneumatic Tires and a Discussion of the Probable Relation to Tread Wear." By W. L. Holt and C. M. Cook. *B. S. Journal of Research*, Vol. 1, 1928, pp. 19-28.



Drawings taken from wax records showing tread movements of different tire treads

portion of the glass. By noting successive positions of any particular point on the tire with respect to a reference point on the glass the movement of the tread rubber can be studied. In order to show up the area in contact plainly it is advisable to coat the glass with a liquid, such as a soap solution or glycerin. If desired, photographs can be taken through this glass as the tire rolls. (See Figure 2.) Visual observations, however, may furnish all the information that is desired. In obtaining data which could be plotted as graphs, a telescope was mounted about six feet away, and observations made through it. This aided considerably in following the movement of particular points in the tread.

Observations of several tires showed that different parts of the tread had characteristic movements. For instance, the central part of a tire usually showed straight-line movements opposite to the direction of travel of the tire, while other parts had a curved movement with a component of motion in

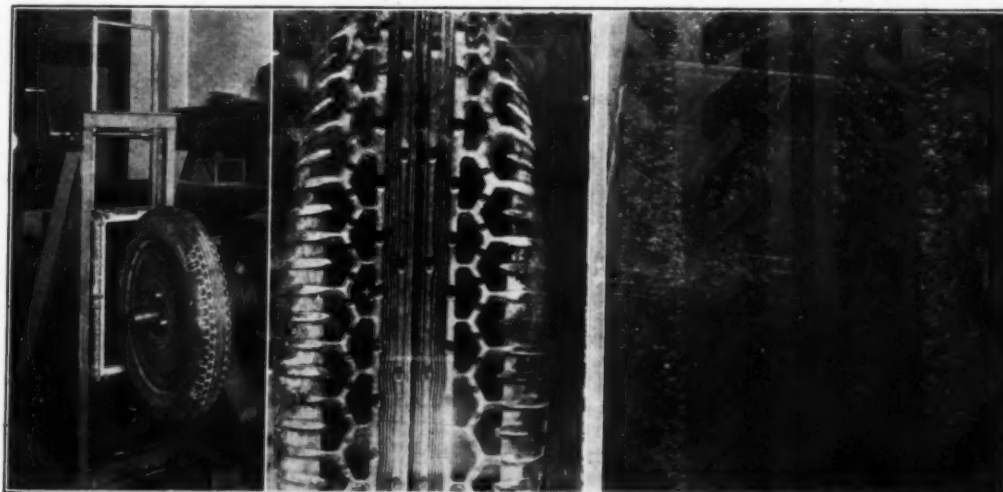


Fig. 1.—Apparatus for Observing Tread Movements Through a Glass Plate

Fig. 2.—Photo Through Glass Showing Contact Area Under Load

Fig. 3.—Wax Plate Showing Tread Movements

the same direction as that in which the tire traveled.

Plotting tread movements in this way, however, is a rather tedious process, therefore a quicker method was tried which proved to be very satisfactory for recording the complete movement of any point on the tread. This method consists of recording the movement on waxed plates and is carried out as follows: Aluminum sheets about 8 by 10 inches and 0.010 inch thick are given a thin coating of melted paraffin wax on one side. Several different waxes were tried out but paraffin was found to give the best results at ordinary room temperature. Harder waxes were not satisfactory. After the wax has set, the surface is sprinkled very sparingly with grains of No. 60 carborundum. As a tire under load flexes when rolled over one of these plates, the carborundum grains (or at least a portion of them) stick to the tire and trace their path on the waxed plate. It is well to roughen the surface of the tread slightly (as with sand or emery paper) to remove any glaze, and give a better chance for the grains to stick.

Figure 3 shows photographs taken of a typical wax-plate record. The straight lines in the central part of the treads and the more or less curved lines in other parts were traced by the individual grains of carborundum. Records were made from several tires by using the apparatus shown in Figure 1, and interposing the waxed plates between the tire and the glass. It was found, however, that practically the same records could be obtained by using an ordinary drum tire testing machine and allowing the waxed plates to pass between the tire and the drum. This offered several advantages because in addition to being more convenient it permitted records to be made under normal conditions of speed and tractive effort.

Different tires were mounted on a drum test machine and records made of the tread movements under air pressures and axle loads corresponding to normal operating conditions. The tire was turned by hand at a speed corresponding to about two miles per hour as the waxed plate passed between the tire and the drum. From these records, the line drawings of treads here shown were made. The arc above each section shows the profile of the raised portion of the tread. These are not intended to be absolute reproductions of tread designs or tread movement, but rather to show what may be expected from different tires and the approximate movements of points in the tread.

It will be noted that the general movements in all the treads are similar. Each tread may be divided into three parts—the center, the intermediate portion, and the outer portion. In the center of the tread the movement is in an approximate straight line along the circumference in a direction opposite to the direction in which the tire travels. The outer portions of the tread also have circumferential movements, but in the direction of travel. In addition they move toward and away from the center line, thus giving the curves observed. The intermediate portions move similarly but the resultant movement may be either in the direction of travel or against it, depending largely on the distance from the center line. A V-shaped mark on a wax plate is a common record from this part of the tread.

Results

The results obtained by recording the tread movements indicate that at least a considerable part of tread wear may be caused by the slipping of portions of the tread over the road surface in changing from the normal to the deflected condition and vice versa. This might be termed a scuffing action. It is recognized that a tire seldom rolls over a surface as smooth as a piece of glass or a waxed plate and that the tread movement on a rough surface may be different from that which takes place on a smooth surface. Nevertheless there will be the same tendency to slip on a rough surface as on a smooth one, and the tread movement on different sur-

faces will simply vary in degree, depending upon the coefficients of friction.

The inference should not be drawn from the preceding discussion that the wear of a tread is attributed entirely to the movements recorded. In actual service, of course, tread wear is dependent on other factors. For instance, high tractive efforts which cause the tire as a whole to slip, slipping due to braking, the bouncing of tires in which they actually leave the ground, and side skidding. All these affect tire wear in addition to the suggested scuffing action. In some cases it is probable that these items are the predominating factors in tire wear, but from a general observation of tires in service it is thought that in most cases scuffing is the important, or at least an important, factor in producing wear.

Storing Harms Uncured Stock

DR. PHILIP SCHIDROWITZ asks in the *India Rubber Journal* (London): "Is there any advantage, apart from works' convenience, to be gained by storing stocks after milling or calendering?" While deferring an answer to this question, he draws some interesting conclusions, however, after reviewing a recent paper by Ralph H. McKee and Harlan A. Depew on "Normal Aging of Compounded Rubber," and in which details had been given of unaccelerated aging tests of nine familiar compounds. Broadly, the effects noted, he says, were great retardation of cure and slight lowering of reinforcing properties, the former being probably due to the formation of sulphurous and sulphuric acids through oxidation of sulphur, and possibly also to the decomposition of organic accelerators. Dr. Schidrowitz regards as partial negative evidence in favor of the first explanation the fact that the cure retardation occurred in the case of two compounds which contained no organic accelerator, namely, a mixing of pale crepe (920 parts by weight) and sulphur (55); and one of pale crepe (920), sulphur (55), and magnesia (64).

The likelihood of damage to stored uncured stocks is also indicated in the recent report of the Physical Testing Committee of the American Chemical Society on an elaborate investigation carried out at the Bureau of Standards, Washington, to determine the effect of atmospheric variations in temperature and relative humidity on the physical properties of rubber, in order that the importance of controlling these factors during testing may be established. It said, in brief: "The investigation has proved that variations in temperature which may occur from day to day in an uncontrolled testing room may affect the physical tests to as great a degree as a 25 to 40 per cent change in the time of cure, while relative humidity affects the results to only a minor degree. Furthermore, variations in the absolute humidity of the room in which the unvulcanized rubber is stored between the time of mixing and the time of curing may affect the tensile strength and modulus of rubber compounds to as great a degree as does the temperature after curing."

Good Aging in Peachey Process

Vulcanized half a dozen years ago at room temperature by sulphur dioxide and hydrogen sulphide gases, a sample of rubber sheeting since subjected to much hard usage shows practically no drying-out. No anti-oxidant was used so far as known to lessen perishing. Some day means may be devised for applying the two-gas process to the curing also of heavy products on a commercial scale. Meanwhile anti-oxidants are likely to continue indispensable for the latter; but technicians will continue to theorize on the cause of the excellent aging effects obtained in some applications of the Peachey process.

Census of Manufactures, 1927

Consumption and Stocks of Rubber Reported by Manufacturers Classified in the Rubber-Industries Group

THE Department of Commerce announces that, according to data collected at the biennial census of manufactures taken in 1928, the establishments engaged primarily in the manufacture of rubber products, rubber tires and inner tubes, rubber boots and shoes, and miscellaneous rubber goods, in 1927 reported the consumption of 364,017 long tons of crude rubber, exclusive of gums, a decrease of 6.1 per cent as compared with 387,629 long tons consumed in 1925, the last preceding census year. The total consumption was made up as follows: 342,216 tons of plantation rubber, a decrease of 4.5 per cent as compared with 358,167 used in 1925; 8,815 tons of Para rubber, a decrease of 14.1 per cent as compared with 10,263 used in 1925; and 12,986 tons of other rubber, a decrease of 32.4 per cent as compared with 19,199 tons used in 1925. The establishments classified in the rubber industries group also reported the consumption of 175,760 long tons of reclaimed rubber in 1927, but no comparable figure for 1925 is available.

Consumption of crude and reclaimed rubber by industries in 1927 was as follows: Crude Rubber; rubber tires and inner tubes industry, 316,295 long tons; rubber boots and shoes industry, 13,424

TABLE 1. RUBBER CONSUMED AND STOCKS AFLOAT AND HELD BY ESTABLISHMENTS CLASSIFIED IN THE RUBBER INDUSTRIES GROUP—1927 AND 1925
(Tons of 2,240 pounds)

	Total	Rubber Tires and Inner Tubes	Rubber Boots and Shoes	Rubber Goods, not Elsewhere Classified
Consumption				
Crude rubber, total				
1927	364,017	316,295	16,424	31,298
1925	387,629	335,873	15,901	35,855
Per cent of increase or decrease	-6.1	-5.8	3.3	-12.7
(—)				
Plantation				
1927	342,216	302,643	13,783	25,790
1925	358,167	318,870	13,741	25,556
Per cent of increase or decrease	-4.5	-5.1	0.3	0.9
(—)				
Para				
1927	8,815	3,861	580	4,374
1925	10,263	4,941	827	4,495
Per cent of decrease	-14.1	-21.9	-29.9	-2.7
(—)				
All other				
1927	12,986	9,791	2,061	1,134
1925	19,199	12,062	1,333	5,804
Per cent of increase or decrease	-32.4	-18.8	54.6	-80.5
(—)				
Reclaimed rubber				
1927	175,760	105,718	11,923	58,119
1925	.....	.....	.....	.....
Crude rubber afloat Dec. 31				
1927	10,713	10,299	.....	.....
1925	.....	.....	.....	.....
Stock on hand Dec. 31				
Crude rubber, total				
1927	45,731	36,933	2,878	5,920
1925	37,250	29,666	2,166	5,418
Per cent of increase	22.8	24.5	32.9	9.3
(—)				
Plantation				
1927	41,406	34,856	2,238	4,312
1925	31,633	26,725	1,745	3,163
Per cent of increase	30.9	30.4	28.3	36.3
(—)				
Para				
1927	2,490	801	271	1,418
1925	2,625	738	219	1,668
Per cent of increase or decrease	-5.1	8.5	23.7	-15.0
(—)				
All other				
1927	1,835	1,276	369	190
1925	2,992	2,203	202	587
Per cent of increase or decrease	-38.6	-42.1	82.7	-67.6
(—)				
Reclaimed rubber				
1927	16,579	9,344	870	6,365
1925	.....	.....	.....	.....

*Not called for on schedule.

†Can not be shown separately without disclosing operations of individual establishments.

TABLE 2. CRUDE RUBBER CONSUMED, DISTRIBUTED ACCORDING TO PRODUCTS MADE, FOR THE RUBBER INDUSTRIES GROUP—1927

of Establish- Tons	Number ments *400	(2,240 lbs.)
Total		364,017
Rubber tires and inner tubes		
Pneumatic		
Motor—vehicles, except motorcycles		
Casings	102	231,505
Inner tubes	81	52,009
Motorcycles, bicycles, and all other casings and tubes	10	1,177
Solid and cushion	19	15,724
Tire sundries and repair materials	34	4,830
Boots and shoes	25	17,164
Rubber heels and soles, including slab soles	44	6,690
Rubberized fabrics, and rubberized and rubber clothing (finished)	47	5,355
Mechanical rubber goods		
Belting	30	3,821
Hose and tubing	43	4,885
All other	78	5,387
Rubber flooring, and rubber mats and matting	39	1,713
Hard rubber goods	24	1,485
Rubber thread	8	2,781
Rubber cement	39	1,482
Druggists' and medical sundries	47	2,022
Toys	34	1,407
All other manufactures of rubber	87	4,580

*This total is less than the sum of the numbers shown in the column, for the reason that many establishments manufacture more than one kind of products.

long tons; rubber goods, not elsewhere classified industry, 31,298 long tons. Reclaimed Rubber: Rubber tires and inner tubes industry, 105,718 long tons; rubber boots and shoes industry, 11,923 long tons; rubber goods, not elsewhere classified industry, 58,119 long tons.

Stocks of crude and reclaimed rubber on hand on December 31, 1927, were reported as follows: Crude rubber, 45,731 long tons, an increase of 22.8 per cent as compared with 37,250 tons on hand at the end of 1925. Reclaimed rubber, 16,579 long tons. (No comparable statistics for 1925.)

The statistics for 1927 and 1925 on rubber consumed and on stocks afloat and on hand are shown in Table 1, and statistics for 1927 on crude rubber consumed in the manufacture of the principal kinds of products by establishments classified in the rubber industries group are shown in Table 2. The figures for 1927 are preliminary and subject to such correction as may be found necessary after further examination of the returns.

Softeners for Reclaim

Two distillation products which are finding application as softeners in the rubber reclaiming industry are Solvenol and Tarol.

Solvenol is a pure pine product and a clear colorless liquid of the following typical analysis:

Specific gravity at 15.5° C.	.....	8550
Unpolymerized residue	.....	1.2%
Refractive index at 20° C.	.....	1.4712
Distillation range according to the A. S. T. M.		

Distillation Method			
1st Drop	164.0	50%	170.4
5%	167.5	60	171.5
10	167.8	70	173.0
20	168.5	80	175.2
30	169.0	90	179.0
40	169.6	95	184.0

Solvenol has been in use for several years by reclaimers as a devulcanizing and softening agent in the regenerating of rubber. It seems to exert a powerful devulcanizing action and cuts down materially the time of processing. It gives tube stocks an excellent texture and smoothness.

Tarol is a compounded product, dark in color, with a gravity of about .990 at 15.5°C. It has been used for a number of years in the rubber trade as a softener, principally in the reclaiming industry.

Organic Accelerators

THE article on organic accelerators in the December INDIA RUBBER WORLD was compiled from data supplied by leading American manufacturers of accelerators and their claims accepted as given by them. However, attention has been called to certain errors in the tabulations of these data and it is desired here to rectify them, particularly those relating to antiaging effect.

It is well known to experienced rubber chemists that DuPont vulcone and vulcanex are chemically closely similar to A-11, A-16 and other aldehyde amine condensation products, therefore in Table 1 none of such products should have been rated superior to vulcone and vulcanex.

Table I has also been questioned with respect to methylene-dianilide. Its odor was reported variously as "slight", "aniline", "none" and its toxicity was reported as "slight" in one case and "none" in two cases. As a matter of fact, all formaldehydeaniline reaction products which contain more than one mol of aniline have a slight odor and give off some aniline when heated to high temperatures. They should have all been reported as "slightly toxic."

Di-ortho-tolylthiourea, Table 3, is a stronger accelerator than thiocarbonylurea and should have been so reported. In Table 4 phenyl-ortho-tolylguanidine was credited as having low antiaging value and in Table 1 hexa-methylenetetramine was stated to have medium antiaging value. As a matter of fact, neither of these accelerators has any anti-oxidant effect.

The effectiveness of accelerators can be accurately compared only under standardized testing conditions, and the results obtained in a test formula may often differ widely from those realized in an actual production formula. Furthermore, it is obvious that the activity, antiaging value, modulus characteristics, etc., of accelerators can be adequately described only by reference to some standard.

Inasmuch as the various manufacturers who furnished the information contained in the tables published in our December issue did not have an opportunity to collaborate and agree upon standards of comparison, it is obvious that the classification of the various properties of accelerators as "low", "medium" and "high" is open to question and we wish to make it clear that the classification of one accelerator as "low" and another as "medium" with respect to activity, tensile, etc., does not necessarily mean that the one is actually higher than the other. For example, grasselevator 808 is classified as "medium" in activity whereas syrupy ethyldeneaniline is classified as "high." It is well known that grasselevator 808 is a much more active accelerator than ethyldeneaniline. We therefore request that our readers bear in mind that the information given in these tables consists of representations made by accelerator manufacturers and that the classifications given therein were assigned without reference to any fixed standards.

U. S. Golf Ball Imports

Imports of golf balls during October, 1928, numbered 276,327 valued at \$117,428 a unit value of 42.5 cents per ball as compared to 41.2 cents in September and 37.7 cents in August. There were 2,605,092 golf balls imported into the United States during the first ten months of 1928 as compared to 2,916,447 in the first ten months of 1927.

Rubber Factory in Prague

J. Hakauf & Sons, of Hradec Kralove, Bohemia, announces the construction of a new rubber factory, which it is stated should prove a serious competitor of existing rubber factories. The new firm adds that it plans to introduce in its plant the manufacture of various rubber products not yet made in Czechoslovakia.

Rubber Aids Neon Lighting

THE brilliantly-colored signs, airport beacons, and other striking lighting effects obtained through the use of electrically-activated neon in vacuum glass tubes might eventually have been brought about without the help of rubber, but it is nevertheless true that were it not for rubber the isolation of that rare gas might have been long delayed and neon lighting be still a-borning, instead of being such a notable scientific, artistic, and commercial success.

Having with Lord Rayleigh in England in 1894 found argon in minute quantity (0.8 per cent) in the air, Sir William Ramsay set about to extract from the atmosphere other rare, inert gases. He succeeded with Dr. Travers in 1898 in recovering by fractional distillation from liquefied argon an element having the lowest dielectric cohesion of any gas (5.6), as compared with air (435), and which needed but the slightest electric potential to set it glowing orange-red in a mercury-sealed tube. Then the newest of the elements, it was called neon. It is estimated to be present in air in the proportion of 1 to 66,000, and is prepared industrially by liquefying air at 475°F. below zero.

Ramsay and Travers found the task of separating this gas from argon very difficult, not only on account of the extremely scant amount of neon in the argon, but also because it had to be separated from the middle fractions of a very inactive gas. Hence it was necessary to design and construct novel apparatus. Moreover, as the samples of air and argon had to be pumped backward and forward at constantly-lowering temperatures and increasing pressures, much trouble was found with leaks. Despite the most careful precautions and the use of the best of valves and stopcocks and the finest of lubricants, gas still escaped.

At last Dr. Travers worked out a rubberized compound for a stopcock grease that was far more viscid and impervious to gases than any theretofore used. With such flexible sealing no gas leaked out nor air intruded, and so successful was the new compound that it not only made the discovery of neon possible, but also facilitated research work on the still rarer gaseous elements.

The formula for the stopcock grease is given as: Pure gum rubber 8 parts, vaseline 16 parts, paraffin 1 part; all to be slowly melted together, and still further stiffened, if desired, with more paraffin.

An Invitation to Call

The following rubber machinery and equipment men will be in New York during the week of January 7, and will be glad to see their friends:

Edward Hutchens, Piccadilly Hotel.
Clyde E. Lowe, The Biltmore.
F. A. Pope and E. A. Pope, Commodore Hotel.
G. L. Hammond, Commodore Hotel.
C. R. Quine, Woodstock Hotel.

Germany's Tire Production

Germany's production of tires and tubes during 1927 was valued at approximately \$48,945,000, which is greater by \$9,760,000, or 25 per cent. than that of 1926, and less by only about \$610,000, or about 1½ per cent, than the value of \$49,555,000 in 1925.

CANADIAN CRUDE RUBBER IMPORTS DURING OCTOBER, 1928, totaled 2,943 long tons valued \$1,408,128, as compared with 2,812 long tons valued \$1,384,235, in September, 1928, and 1,796 long tons, valued \$1,390,063, in October, 1927.

The Evaluation of Carbon Blacks

D. F. CRANOR and H. A. BRAENDLE

THE present day application of carbon pigments to rubber compounding makes necessary a broader use of stress-strain data for the evaluation of individual blacks and proper classification of the members of this important group. A decade ago the rubber man's interest in pigments centered on their behavior in tire tread proportions, but now impingement process black is commonly used in loadings up to, and in some instances, above 100 parts by weight to 100 of new rubber, and the carbon family has grown through introduction of the materials commonly referred to as "soft blacks." Although performance tests, in particular aging and abrasion resistance, have been somewhat refined and

further developed, stress-strain data remain the primary criteria and it is through employment of the newer conceptions developed from these that we can best draw a picture sufficiently complete to properly group and classify the various members.

Wiegand's paper, "The More Complete Evaluation of the Pigment Reinforcement of Rubber," gave to the industry in the "A" and "Delta A functions" more adequate measures of the effectiveness of pigments. The present authors have employed the "Delta A" criterion in the testing of carbon blacks; and since its derivation is fully covered in the original it is only necessary, before using this measure of rubber quality, to briefly discuss its significance.

The energy or proof resilience of a rubber compound undeniably combines more information regarding the quality of a given compound than does any other single criterion. Similarly for the comparison of pigments the "A" and "Delta A functions" sum up the stress-strain characteristics and indicate the limits of usefulness. The "A function" is the total energy which is developed by successively increasing pigment loadings in a chosen base compound, or in other words it is the integral of energy against compound loading. If we plot a curve giving the energy development by a series of pigment loadings (as in Figure I), the shaded area, or the area under the curve, gives what may be called total energy, or the total stored work available from every type of compound which might use that pigment. Because this index has no strict physical counterpart it was necessary to invent a name and it was called the "A function." However, since the matter of greatest interest to the user of carbon black is the additional quality or extra toughness imparted by the pigment, the "Delta A function," which indicates this extra energy, is more generally useful. This is the integral of this excess energy with respect to loading, and is represented by the double-hatched area of Figure II. Perhaps the "Delta A function" might best be described, however, as the energy capacity, or inherent energy, of a pigment in connection with a given base mixing.

Modulus

Modulus figures may serve as ready means for distinguishing between carbons of different sorts but must be employed most carefully to be at all significant. Recent researches have shown

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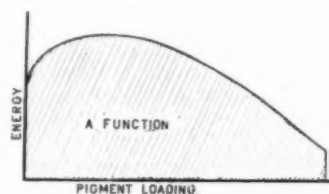


Fig. 1.

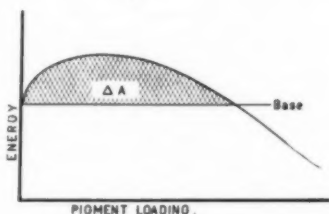


Fig. 2.

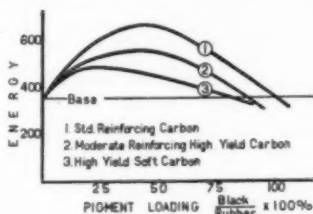


Fig. 3.

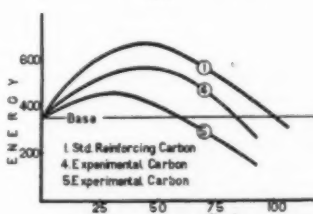


Fig. 4.

it necessary to determine very complete modulus data when such are to be used for evaluation of the carbon pigments, because, in organically accelerated mixings, it is sometimes the case that although one black may yield a higher modulus than another if compared at 300 per cent elongation, the order becomes reversed if comparison is made at, for example, an elongation of 50 per cent. The data of Goodwin and Parks establish this point which is fully substantiated by unpublished figures accumulated by the present writers.

This reversal of order is, however, profoundly affected by the type of acceleration employed and it is still difficult to state to what extent this is due to accelerator set-up resulting from difference in rate of cure and how

much it is due to the inherent qualities of a carbon black. Consequently in the present paper which is confined to fundamentals, we are limiting ourselves to the "Delta A function" as referred to a basic test formula.

The Test Formula

In the development of the data which are here presented the base mixing employed was: Rubber, 100; litharge, 30; sulphur, 5. Total, 135.

It might, at first sight, appear strange that a litharge test formula was selected, rather than one containing a typical organic accelerator of vulcanization. This was done, however, for the reason that each of the individual blacks was found to differ in its effect upon the commonly used organic rubber accelerators.

We believe that it is entirely impossible to draw any conclusion regarding the effect of pigments or other compounding ingredients upon rubber unless comparison is made under equivalent vulcanizing conditions. Trite as it may seem to introduce a remark such as the foregoing it is astonishing how often this point is not sufficiently stressed.

Selection of a state of vulcanization or optimum cure at which to compare samples, presents problems by no means easy to solve and leads directly to the question, what are the proper cure criteria for work of this nature?

The object of pigment research applied to rubber compounding is to determine the effect of each pigment upon the various physical properties, and it is, therefore, obviously not in order to set up a fixed value for one of these, e.g., modulus, as the criterion for selecting comparable cures.

Regarding the matter of bringing all samples to a comparable state of vulcanization, there are three possible means of attack: (1) Compensation by changing the time of cure employed. (2) Compensation by changing the proportion of accelerator used. (3) Employment of a compound whose rate of cure is unaffected by the introduction of the ingredients under investigation.

The errors introduced may be enormous when attempts are made to compensate for varying accelerating or retarding effects through use of different periods of cure, principally because neglect of the set-up factor cannot fail to destroy all standards in such cases.

Changing the proportion of accelerator to compensate for the effect on cure of other ingredients is not unsound practice, but requires such nice adjustment of accelerator as to make this procedure a questionable expedient in pigment research.

The most valuable pigment studies thus far published have been those carried out with a flat-curing litharge mix as the base compound, and for this paper the litharge formula above indicated was selected in order to iron out the differing effects of the pigments under consideration.

In a preliminary way cure was established by hand-tear tests as employed by Dinsmore in his more recent papers, and for a control and check on these estimations combined sulphur determinations were used. We have found by such means that the litharge compound employed does iron out the effect of the blacks on rate of vulcanization, and in a 40 parts by weight loading, for example, combined sulphur values for the five pigments under comparison, gave results as follows:

SAMPLE DESIGNATION	COMBINED SULPHUR
Sample No. 1.....	1.84
Sample No. 2.....	1.75
Sample No. 3.....	1.90
Sample No. 4.....	1.78
Sample No. 5.....	1.82

It is not the purpose of this paper to present an elaborate discussion of the methods available for determination of state of cure, and it seems necessary only to say in connection with the use of sulphur figures that although this determination has little, if any, value in estimating the cure of unknown samples or in differentiating between various states of vulcanization, it certainly does, however, serve as an indication that a series compounded from a given base is or is not uniformly vulcanized.

The significance of the stabilization effected by this type of mixing will be appreciated when it is understood that in formulas accelerated with D.P.G. and other organic materials, it may be necessary to double the time of cure required to bring the fine reinforcing black to the cure condition of the filler type.

The fact that carbons made by different processes have specific effects upon vulcanization is explained by differences in absorption activity. All blacks are produced under high temperature conditions since the basic reaction involved is thermal decomposition of hydro-carbon gas. Activity is conditioned on fineness of particle size, the degree of temperature and duration of exposure to temperature which the pigment undergoes following formation. Through regulation of manufacturing conditions the product of any given type of process may readily be held uniform but it naturally follows that blacks turned out by distinctly different methods differ in this respect. In practical compounding it is easy to adjust the amounts of organic accelerators to compensate for this but different conditions must be met in the case of scientific study undertaken for the purpose of basic evaluation. Since litharge is unaffected by the absorptive capacity of the carbons it is the best accelerator for this fundamental work.

Dispersion

Next to the choice of a base compound, probably the most important factor affecting the tests is complete dispersion. This calls for different handling with each loading of the various sorts of black. Where there is 40 per cent or more of carbon to the rubber in a mixing very little additional precaution need be observed to assure similar dispersion of all the blacks. However, in the case of more complex formulas involving the use of reclaims, bitumens, emollients, etc., and also in a simple mixture containing a relatively small amount of black, more attention must be given to dispersion. Here, laboratory procedure follows the best factory practice, namely: use of master batches, or the nearest equivalent; addition of black to a sufficiently small proportion of the total rubber and at a point before addition of softeners, so that the pigment is incorporated while the rubber is sufficiently firm to break down agglomerates which may form in packing, or by passage through the bite of the mill rolls.

The "Delta A Function"

For the present discussion the writers have chosen three commercial carbons and two experimental blacks, as follows: 1. Standard reinforcing carbon black. 2. Moderate reinforcing high yield carbon. 3. High yield soft carbon. 4. Experimental carbon black. 5. Experimental carbon black.

These blacks were mixed into the base compound in successively increasing proportions, cured as described and tested under uniform conditions of temperature and humidity.

In Figure III are shown the "Delta A function" for samples 1 to 3, representing blacks now in use in the industry.

We see that standard reinforcing carbon develops the highest energy at all loadings and that it has the longest range of useful loadings.

Carbon No. 2 exhibits moderate reinforcement over a fair range of loadings; while Carbon No. 3 is only slightly reinforcing.

It is interesting to note that the energy-volume loading curve for standard carbon in the fundamental base used, shows a distinct plateau effect from 40-50 per cent pigment loading on the rubber, which is in close agreement with tread compounding practice and experience with all types of organic accelerators, diluents, emollients, etc. Also, this is the only black suitable for use in very high loadings where extreme hardness and toughness must be combined, as in solings and special mechanical rubber goods.

The Class 2, or moderate reinforcing carbon, shows an optimum considerably lower and slightly earlier. Since this grade of black is comparatively new there is not the same background of experience to confirm its position as shown by the "Delta A function." However, so far as data are available they are in close accord with the present findings.

Sample (3), or the soft carbon, gives its best results as a diluent pigment, which is also confirmed by experience in many plants and compounds.

In Figure 4, are shown experimental blacks No. 4 and No. 5 against standard reinforcing carbon. No. 4 carbon exhibits a fair peak but its range of usefulness is somewhat short. No. 5, as it stands does not have much to recommend it to the rubber man since it develops neither high optimum energy nor long range of usefulness. However, it exhibits qualities distinctly different from the category employed as rubber fillers. Thus, it is seen that this method of evaluation is useful, not only in classifying successful commercial grades according to basic stress-strain qualities but also that it is valuable in research and development work with new carbons, assisting as it does to differentiate between products which are commercially important and those which may have only a limited application, or which may be entirely unusable as they stand.

Quantitatively, the blacks here discussed are accurately summed up in Table I, in which for convenience, the standard is designated as 100.

TABLE I

Black	Energy Capacity or "Delta A"
1 Standard reinforcing	100
2 Moderate reinforcing high yield.....	64
3 Soft, high yield.....	35
4 Experimental	64
5 Experimental	21

Conclusion

In conclusion, it is shown that the "Delta A function" provides an instrument for the classification of carbon blacks as regards their usefulness to the rubber compounder. It is an index of widely inclusive character and not only indicates performance at optimum concentration but also the range of effectiveness.

The writers have undertaken exposition of the special applications of this to the classification of carbon pigments, pointing out the precautions necessary for its accurate use. We believe it important to supplement the "Delta A function" with other stress-strain data, also with laboratory performance tests, and finally with service records, when it is necessary to differentiate between carbons of the same general category. On the other hand we believe no study of carbons or other pigments is complete unless "Delta A" values are included.

Acknowledgment is gratefully made for the valuable suggestions of W. B. Wiegand and also the cooperation of Binney & Smith Co., who supplied all of the carbon blacks investigated and gave permission to publish the data covered by this paper.

Rubber and Reclaim Consumption

The total consumption of crude rubber in the United States by 400 reporting establishments classified under the rubber industries, during 1927, was 364,017 tons, and the total consumption of reclaimed rubber was 175,760 long tons, the ratio of reclaimed rubber to crude rubber being 48.3 per cent.

Washing Hard Rubber Dust

MAX RATHKE

IF the hard rubber dust is to be freed from impurities like sand, metal or other hard substances, then air blowing suffices for the purpose. In larger factories where in the course of a number of years thousands of pounds of impure dust have accumulated, which could not be worked up before, the dust washing process may be employed. However, the reclaimed dust is only suitable for inferior qualities of rubber goods. It is generally polishing dust that has accumulated in the large factories and is almost unusable, but washing makes it fit for manufacture. The residues from air blowing, when washed, again yield a good product but it does not pay to institute a washing process for this purpose alone. The following is a description of a washing method devised by the writer and carried out successfully in practice.

Referring to the illustration, the washing channel is of wood and about 30 m. long. The parts A1-6 are each $5\frac{1}{2}$ m. long, and since the ends of each rest on each other, the total length of the channel is about 30 m.

The parts A1-6 are made of strong wood, 25 cm. wide and 10 cm. high, closed at one end. The channels are dressed on the inside, but may be left unfinished on the outside. At distances of $\frac{1}{2}$ m., cross pieces 25 mm. high are arranged in the channels and the outflow ends have wood triangles to constrict the flow. The channels have a slope of 5 to 6 per cent which can be increased or diminished by means of the supports B1-4. To make the wooden channels watertight, it is recommended not to nail them but to screw them together and to put a thin packing between, or after completion to fill the seams with asphalt.

The tank C, in which the dust is washed, has a discharge valve at the bottom. D is a filter consisting of a wooden frame, lined on the inside with coarse sackcloth, and in order to prevent the cloth from bulging too much, it is reinforced with a strong, large meshed metal fabric. This filter is about 80 cm. long, 40 cm. wide and 30 cm. deep, and is mounted on a truck so that it can easily be moved about. E is a cement tank which is built in the ground and over which rails of U-iron are arranged on which the filter truck stands. F is a wood frame provided with steps, and supporting the dust tank C.

The working process is as follows: The finely ground dust is washed into the container C by hand or by a mill, in the proportion of 1 to 5. It is not necessary to be sparing of water, for the water that is accumulated through the filter D into

The accompanying illustrated description relating to a German method of reclaiming hard rubber dust was submitted by the inventor for publication in INDIA RUBBER WORLD so that American manufacturers may be informed regarding the foreign practice of dust washing.

the basin E can be pumped into the container C and again used for washing, and this may be continued until the water gets dirty. Floating impurities can be sieved off at the container C. Before using the washing channels, clean water is run over them so that small quantities of water may accumulate in front of the cross pieces.

Now the dust and water can be let into the washing channels through the valves, meanwhile the mass in the container must be constantly stirred so that the dust cannot

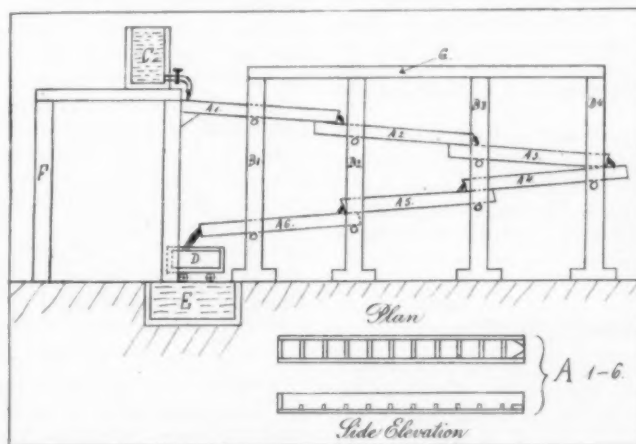
settle on the bottom. When the container C is empty then the same process is started again. In order to shorten or eliminate the intervals between washings, it is well to have two containers C, so as to allow the dust to run in to the channels continuously and the mixing with water is done by two persons.

The cleaning process takes place as follows: The dust water acquires a certain velocity through falling and plunges into the water that has accumulated in front of the nearest 25 mm. high cross piece. The pressure is just sufficient to allow particles of specific gravity 1.20 to be lifted over the cross piece into the next compartment. This process is repeated in front of each cross piece, and as it happens so often, the dust is cleared of all impurities that are heavier. Actually cleaning already takes place in the first three channels, A1-3, the channels A4-6 are for security in case of unforeseen instances. If particles of greater specific gravity are to be lifted, then the slope of the channels must be increased. Black dust which has been rendered impure by red dust can be cleaned in this way, because red dust in most cases has a much higher specific gravity.

The entire washing channel works like a cascade waterfall. After the dust water passes a few containers of clean water are run into the channels in order to float away any dust that may have settled there into the filter.

If there is much impurity in the channels A1-3, then these must be cleared. If much dust is contained in it, then it must be mixed with water again. It is practical to have two or three filters D, so that they can drip longer and they should be placed on the rails over the basin in such a way that the filter truck can also be moved sideways.

The so-called rack-drier is the most suitable for drying the dust. The dust which emerges from the apparatus like a powder must be cooled in iron pans and is then sifted. Other drying methods, for instance on hot plates or in vacuum, have not proved successful.



German Method of Washing Hard Rubber Dust

Rubber Division A. C. S.

Akron Group Meeting

THE third meeting of the Akron Rubber Group of the American Chemical Society which was held on Monday evening, December 3, was attended by approximately 350 chemists and rubber technologists. Dinner was served at 6.30 p.m. in the dining room of the Firestone Tire & Rubber Co.'s clubhouse, after which the group adjourned to the auditorium where Dr. Bradford Noyes, of the Taylor Instrument Co., Rochester, N. Y., delivered an address on "Temperature Control in the Rubber Industry."

Dr. Noyes' address was illustrated by the use of stereopticon slides which showed the development of the modern thermometer and thermo-temperature control from the earliest crude thermometer. Views of the more modern pieces of equipment were explained by sectional diagrams. The value of double recording charts was explained, and it was shown that by an observation of the temperature of inlet steam and steam condensate many incorrect curing conditions could be eliminated.

The second paper of the evening was presented by R. W. Moorehouse of the Goodyear Tire & Rubber Co. on the subject "Temperature Control of Mill Rolls." The temperatures referred to in this paper were taken by a resistance pyrometer and were shown by means of graphs. Some of the common errors, which at times reach 10° may result from variation in the size of the bank; variation in gear ratio; variation in the stiffness of the stock and its thickness when cut from the rolls.

Lawrence Keltner, of The B. F. Goodrich Co., presented the next paper; "Temperature of Calendar Rolls." Mr. Keltner emphasized the fact that calendar specifications would not be complete unless calendar roll temperatures are included. The method of ascertaining the roll temperature was by placing a hot junction in a small manganese-bronze shoe and holding it firmly against the roll by means of a lever.

The final address was given by C. R. Mitchella of the Republic Rubber Co. His subject was "Temperature Control of Vulcanizer Heaters." The speaker pointed out that some of the advantages of temperature control were: economy of steam; economy of accelerators; uniformity of temperature and the proper sequence of operations such as a step cure. To insure a uniform temperature within a vertical type heater, perforated openings were used as steam inlets, thus causing more even distribution of heat, and consequently more uniform cure. Perfect circulation of steam and perfect drainage of condensed water are important, as both lower the possibilities of under cure that would result if air pockets and excess of cold water were allowed to build up in the heater.

The next meeting of the group will be held January 28 at the Goodyear Theater, at which time the annual election of officers will take place. The subject for discussion at this meeting will be "Measurement of Thickness" and will be conducted by Drs. Evans of Goodyear, Dietrich of Goodrich, and Brown of Firestone.

Los Angeles Group Meeting

Los Angeles Group, Rubber Division, American Chemical Society, had its fourth annual meeting and dinner at the Mary Louise restaurant December 14. A special feature was a discourse on "Internal Mixers" by W. R. Hucks, chief chemist of the Pacific Goodrich Rubber Co., which proved of much interest to the fifty-four members present. He dwelt

particularly on the good results which his company was experiencing in breaking down rubber and mixing ingredients (except sulphur) with the No. 27 Banbury mixer and sulphuring the compound on open mills. He explained the action of the Banbury machine and the Gilson plasticator and answered many technical questions. Many new names were added to the membership roll and the following officers were elected for 1929: Chairman, A. F. Pond; vice chairman, E. S. Long; secretary-treasurer, W. R. Hucks; executive committee, R. B. Stringfield, E. L. Davies, and W. E. Shawger.

Rubber Association of America

Meeting and Dinner

The fourteenth annual meeting of The Rubber Association of America, Inc., will be held in the West Ballroom of the Hotel Commodore, Lexington Ave. and 42d St., New York, N. Y., beginning at 10:30 a.m., Monday, January 7, 1929.

Each firm member is entitled to a vote to be cast by the registered firm representative only, unless his power is delegated to someone in the employ of or acting for the firm member and holding a written proxy.

Affiliated members may not vote for the election of directors nor upon questions which relate solely to the rubber industry itself. On all other matters each affiliated member is entitled to a vote to be cast by its registered firm representative only, unless his power is delegated to someone in the employ of or acting for the affiliated member and holding a written proxy.

Those who use a proxy should be careful to indicate the nominees as only those proxies will be counted which are accompanied by definite instructions as to the nominees for which the vote represented by the proxy shall be cast.

The regular order of business will begin at 10:30 a.m. A luncheon is to be served at 1:00 p.m. to all in attendance, without charge. Following luncheon, opportunity will be given for discussion of any subjects in which members may be interested. It is the earnest wish of the officers and directors that all firm representatives be on hand promptly at 10:30 a.m. and that everyone stay for lunch and participate in the informal discussion which is to follow.

The twenty-ninth annual dinner will take place in the Grand Ballroom of the Hotel Commodore, on Monday, January 7, 1929, at 7.30 p.m. Tickets ten dollars. Ladies will be admitted to the balcony boxes which hold six persons, at 9 p.m. Tickets are required and should be applied for on the regular ticket form.

It has been decided to depart on this occasion from the past custom of inviting outstanding men to address the association, and instead arrangements have been made for a program of high-class entertainment, with such outstanding stars as a group of Albertina Rasch dancers, Signor Giovanni Martinelli, premier tenor of the Metropolitan Opera Co., and Weber & Fields in person.

It is especially important that the dinner begin on time. Everyone is therefore urged to be punctual in order that the ballroom may be opened to the guests at 7:30 p.m. sharp.

A. W. STILL, WHO STILL URGES COOPERATION AMONG RUBBER PRODUCERS to limit rubber production and apparently still thinks prospects for further governmental restriction are not absolutely hopeless, comments on producers making forward sales at low prices, and takes an opposite view.



Annual Dinner of the Rubber Trade Association of New York, Inc.

Rubber Trade Association Banquet

EACH year the Rubber Trade Association of New York gets together for a good dinner and a lot of fun. As in the past year the banquet and entertainment was held in the Music Room of the Biltmore Hotel, New York, N. Y., on the evening of December 12, 1928.

More than one hundred and fifty members of the association and their guests assembled in the foyer to exchange greetings with friends, old and new. Here business was forgotten for the time being while good fellowship dominated the groups of rubber men who seemed interested only in being friendly to each other. Many of the older members of the trade were noticeably absent, and there were many new faces to be seen.

The dinner, as on previous occasions, being excellent was enjoyed by everyone, while the orchestra played and the song master led choruses of popular songs in which all took part.

During the dinner Jack Gropper of the orchestra introduced a new and startling act which consisted in playing popular airs, accompanied by the orchestra, on an inflated rubber glove, while the music he elicited from a piece of tubing was remarkable. William H. Gleim, who besides being a rubber man is the possessor of a fine tenor voice, sang solos in a most artistic manner.

The dinner being over President Pusinelli called the meeting to order and introduced William E. Bruyn, former president of the association, who briefly reviewed the activities of the association since its formation in 1914. While the functions of this organization may have been more or less circumscribed by changing conditions in the industry, the need of the R. T. A. is still very apparent and particularly in arbitration matters.

F. R. Henderson, former president of the association and president of the Rubber Exchange, then addressed the members on the delightful informality of this occasion in which he was most happy to take part. He spoke of the need of closer contact with the Rubber Trade Association of London, and proposed a toast to the English organization. A toast

was also given to the Rubber Division of the Department of Commerce, to which E. G. Holt, chief of the division, responded with fitting remarks concerning his department and its functions toward giving comprehensive and reliable information to the rubber industry.

The entertainment that followed was both unique and startling. Introduced by Mr. Henderson as a man of mystery, Dunninger proved to be positively uncanny in his performance. He executed feats of legerdemain and mind reading that bordered on the marvelous.

The popular singers and guitarists Miller and Farrell closed the program with their inimitable ditties.

This very enjoyable evening was due to the efficient management of the Dinner Committee comprising: H. S. Rodenbough, W. H. Bass, and L. D. Stiles.

The following were seated at the president's table: F. Pusinelli, president of the association; D. D. Haldane, vice president; William E. Bruyn, F. R. Henderson, C. T. Wilson, former presidents; D. A. Paterson, treasurer; E. G. Holt and B. G. Davy, secretary-manager of the Rubber Trade Association of New York.

American Goods Scarce in Malaya

That Americans who buy most of the exports from the crude rubber center of the world provide but a negligible share of the imports of British Malaya, is stressed in *Commerce Reports*. American exports to Malaya might be raised from a minor to a major position if an independent financial combination of American manufacturers were formed to buy and sell in the Malayan market and to maintain a local selling organization. Were the latter in a position to also buy Malayan products, American prestige would be even stronger. As indicating the desirability of such market, Malaya has a per capita foreign trade of over \$300 per annum—the highest of any country in the world.

EDITORIALS

Money-Making Research

THAT American industrial progress would soon leave little to be desired if the funds now going into extra dividends were invested in research and development, is the opinion of L. V. Redman, who has long directed such work for a great industry founded on research, the Bakelite Corporation. It is hard to say how far this dictum might aptly apply to the rubber industry, but there is good reason to believe that the latter with its many important and unsolved problems and its limitless field and opportunities should fare as well as any other through a well-ordered "substitution of planned experiment for haphazard experience, and through making things happen through controlled conditions instead of observing simply what happens by chance."

The trouble, however, seems to be not so much in impressing industrial leaders with the general merits of research as in convincing them that it is applicable and practicable in their lines, and that in order to get maximum benefit they must properly understand and apply certain economic factors.

A common impression that research is a gamble arises, we are told, from failure to distinguish between research proper, which is relatively inexpensive, and its industrial exploitation, usually termed development, which may be a costly procedure. Sometimes research may miss its goal yet stumble over a veritable gold mine, as in the classic revelation of organic accelerators in the hunt for a vulcanizing agent for synthetic rubber; but, even though its immediate results be meager or negative, it generally pays in useful knowledge gained.

Most of the pitfalls could be avoided if those attempting a research campaign would first assure themselves that the chosen project is the most promising of many interesting research successes following intensive study of an industry, that it is scientifically sound, that there are plainly no difficult manufacturing problems involved, and that the product sought would be of undoubted industrial value, meeting a widespread need or for which a considerable demand could be created through usual means.

Stress is laid on the importance of not only checking and rechecking all experimental work, but also feeling the way systematically from small way to large scale production. Great failures may often be traced to at-

tempted short cuts and to overeagerness to realize on a laboratory advance before all practical tests are complete, as well as the neglect to reinvest over a reasonable term a fair portion of income to more securely intrench a new development.

Mergers Mislead Many

WHILE some rubber manufacturing companies have undoubtedly improved their position through amalgamation with larger or stronger concerns, it is also true that some of the latter have been much handicapped through absorbing weaker members at a great price. Such prospective advantages and disadvantages are never stressed, however, by cheery promoters interested not so much in the ultimate welfare of any of the constituent companies as in the immediate profit to be made in floating large bond or stock issues. Prof. McKinsey of the University of Chicago in reviewing the history of thirty-five mergers of not less than five companies each says that while their promoters had predicted a 45 per cent increase in profits within ten years, the actual profits for such period have been 18 per cent less than they would have been had the companies operated independently. Thus once more we real-

ize that "all is not gold that glitters." Certainly it behooves rubber manufacturers who have been prospering to first amply reassure themselves before accepting a tempting offer of merger that this does not also mean that they may lose as much as they may gain by having to share their hard earned success with others not so fortunate and perhaps may have to reconcile themselves to diminishing instead of increasing returns.

JUDGING BY CURRENT COTTON QUOTATIONS, LIVERPOOL is not worrying about the 3,500,000-pound crop of "artificial cotton" from a mystery plant to be produced soon in Essex and Sussex and to be sold at about two-thirds the present cost of the real article. It has raised no more of a furore than would a report in Mincing Lane of a plant being cultivated to yield "artificial rubber." Much is said of the qualities of the new material, but scanty is the information that most rubber manufacturers require about stapling length, interfiber coefficient of friction, volume condensibility of paralleled fibers, and tensile strength of yarns and cords made of the new "cotton."

*A Happy New Year
and a prosperous one!
May all of our friends
here and abroad have
the good luck to wish
wisely and their wishes
be realized.*

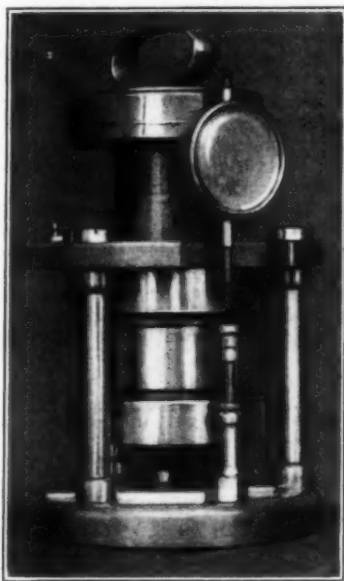
*Thus the rich promise
of this new year to
our industry and to
the world will be
fulfilled.*

What the Rubber Chemists Are Doing

Plasticity and Elasticity of Rubber

A. VAN ROSSEM AND H. VAN DER MEYDEN¹

THE following extract refers chiefly to the apparatus and method employed by the authors in their investigation on the plasticity of masticated and vulcanized rubber by compression-recovery tests. There are, generally speaking, two methods of determining the plasticity of rubber:



Plastometer with Loose Plate

1. The extrusion method, in which the masticated dough is extruded through an orifice (Marzetti), and the extruded portion weighed. This method can be used only for masticated rubber and rubber mixings.

2. Compression method, in which a piece of raw or masticated rubber is compressed and the decrease in thickness is measured. This method has been used in the past by many investigators for plasticity measurements of various substances, e.g., by Speedy,² who as long ago as 1920 carried out plasticity determinations on gutta percha, balata and various bitumens with the Widney resiliometer, an apparatus based on the compression principle. Williams³ was the first to apply this method, in 1924, to the determina-

tion of the plasticity of rubber, and since then De Vries⁴ especially has made use of this method in his extensive investigations on the plasticity of raw rubber.

In the Netherland Government Rubber Institute also plasticity measurements have been made out according to this second method. The plastometer which was used for these experiments was constructed by J. A. C. van Kampen, instrument maker of the Laboratory of Technical Botany, Technical University, Delft. For the details of its construction reference may be made to the publication of De Vries,⁴ who used the similar instrument.

One important alteration was made in the instrument. Most of the previous investigators have compressed the rubber between two parallel plane surfaces and have measured the decrease in thickness in relation to time. During such measurements the surface of the rubber under pressure is continuously increasing and therefore the pressure per unit of surface is continuously diminishing.

Bingham,⁵ who more than any other investigator has contributed towards the theory of plasticity, always used a constant pressure (per unit surface) in his experiments. It seemed advisable therefore to have a constant pressure per unit surface in our plasticity experiments. This condition was easily fulfilled by pressing the rubber on a platform of 1 sq. cm. surface, screwed into a loose ground plate. In this way the rubber flows from the platform and only a constant area is pressed. The loose plate

with platform is clearly visible in the accompanying illustration.

The decrease in thickness of the rubber is measured by a gage, which reads to 1/100 mm., and the plastometer can be used at any temperature by making use of a constant temperature thermostat or drying oven with glass window.

Various investigators carrying out plasticity measurements have simply determined the curve of decrease of thickness in relation to time of pressure and have used the thickness of the rubber after an arbitrary period of time as a measure of plasticity. It may be pointed out that such curves do not establish the plasticity of the material under investigation.

The Valuation of Jelutong¹

C. D. V. GEORGI

THE following excerpts include the approved method for determining the moisture content of jelutong or pontianak as developed in an extensive study of evaluation of this material.

When jelutong is dried, three factors affecting difference in weight must be considered, a loss in weight due to dessication, an additional loss in weight owing to slight decomposition of the material and a gain in weight owing to absorption of oxygen by the heated material. It will be realized that the last two are the important factors when considering the question of drying to constant weight.

As a result of a large number of determinations it has been found that jelutong from certain sources, for example Sarawak, has a tendency to gain in weight when heated to a temperature of 100 degrees C. for a period exceeding six hours.

Although the material darkens considerably on heating and there is a slight odor of decomposition, a gain in weight is frequently recorded on heating for this period. It is difficult to explain the reason for this increase and, until more information is available regarding the composition and stability of the resins present in jelutong, it can only be assumed that two chemical changes, involving absorption of oxygen and decomposition of the material, are taking place simultaneously, the former change at a more rapid rate than the latter.

It is possible that the presence of kerosene in the Sarawak jelutong may affect this material on drying. Kerosene is largely used in Sarawak as a coagulant for the latex, and it is difficult to remove the last traces of this substance by the ordinary process of refining with boiling water.

When carrying out moisture determinations in the laboratory the material is therefore weighed every three hours and, when an increase in weight is recorded, the lowest weight is taken as a basis for the calculation of the moisture content. It is realized that in any case the results can only be regarded as approximate but, since this procedure is always followed, the results are comparable.

V. R. Greenstreet, assistant agricultural chemist, found considerable variations between the moisture contents of samples from similar positions in the same block. Thus in one case, the figures for the moisture contents of samples taken from the four corners of the same block were found to be 47.8, 48.5, 49.1, and 54.7 per cent respectively.

For the accurate determination of the moisture content of a block it was evident that little reliance could be placed on this method, unless a large number of samples was removed, and another method was therefore worked out by Mr. Greenstreet in which the whole of the material in the block was used for the determination. This method may therefore be regarded as an absolute method for the determination of the moisture content of a block.

The block is weighed and cut in pieces. The pieces are passed two or three times between crepeing rollers and made into a length of thick crepe. The crepe is dried superficially by shaking off the

¹From the proceedings of the International Congress for Testing Materials, Part II, p. 479 (published by M. Nijhoff, The Hague, Holland, 1928).

²Jour. Soc. Chem. Ind., 39, 18T (1920).

³Ind. Eng. Chem., 16, 362 (1924).

⁴Archief, 8, 223 (1925).

⁵Fluidity and Plasticity (New York, 1922).

¹Malayan Agr. J., June, 1928, pp. 220-33.

drops of water and wiping the surface with a cloth. The length of crepe is rolled up and weighed. A fraction of the weight, one-quarter or one-fifth, dependent on the weight of crepe, is taken by cutting a transverse section from the roll, and the process of crepeing, wiping and removing a similar fraction of the weight of the resulting roll repeated. This portion is creped finely, dried in a warm cupboard for 10 hours at a temperature of about 40°C. and weighed on cooling. An aliquot portion of this crepe is taken and dried to constant weight in a steam oven.

The following example of the method of calculation may prove useful:

	Gr.	Weight of Moisture. Gr.
Weight of block	3,600	
Weight of block after crepeing	2,835	
Loss of moisture	765	765
Weight of one-fifth portion of crepe	567	
Weight after crepeing	550	
Loss of moisture	17	
Loss of moisture for whole block		$17 \times 5 = 85$
Weight of one-fifth portion of crepe	110	
Weight after crepeing and drying at 40° C. ..	90	
Loss of moisture	20	
Loss of moisture for whole block		$20 \times 25 = 500$
Weight of dish	32.375	
Weight of dish+jelutong	37.375	
Weight of jelutong	5.000	
Weight of dish+jelutong after drying	37.175	
Loss of moisture	0.200	
Loss of moisture for whole block=	$.200 \times 25 \times 90 \div 5 = 90$	
Total		1440
Moisture content = 40.0 per cent.		

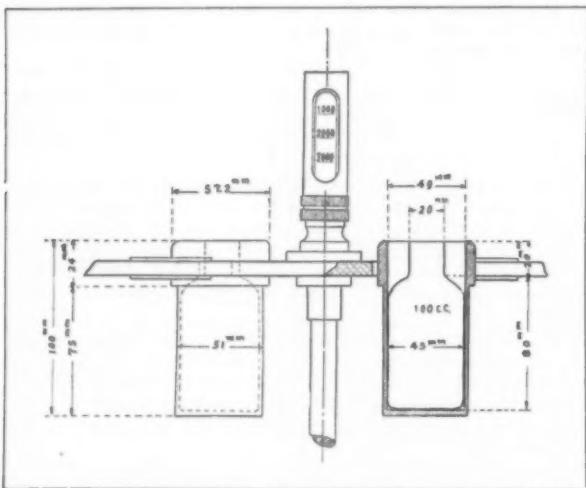
Inorganic Matter in Soft Rubber¹

S. MINATOYA, H. OKUHARI AND S. OHKI

THE report, in Japanese, of an improved method for the analysis of soft vulcanized rubber is contained in the following English synopsis by the authors.

None of the large number of methods previously published were found accurate enough for practical purposes. The method now suggested to employ solid paraffin as a solvent for rubber compounds works satisfactorily in determining quantitatively the inorganic matter in the rubber coating of insulated wire.

The procedure is as follows: Place exactly 1 gm. of finely divided rubber in a tared dissolving flask of about 100 cc.



Apparatus for Determining Inorganic Matter in Soft Rubber

capacity, add 10 gm. of fragmentary solid paraffin and keep the flask at 180° C. on an oil bath. The soaked rubber particles swell in the melted paraffin and after 20 to 50 minutes dissolve completely into turbid liquid owing to the dispersion of powder substance, but still more heating is necessary until the finely dispersed mineral matter begins to coagulate and the upper layer

of the liquid becomes clear. At that point heating is stopped and the flask removed from the bath. Then 70 cc. petroleum benzene is added to the warm liquid.

After standing on a steam oven for about 15 minutes, counterpoise the flask in a centrifuge (see diagram) against a similar flask holding the same kind of contents or merely water, and whirl the flasks for a few minutes running at 2,500 revolutions per minute. All solid matter, even colloidal clay or gas black which may often be used in compounding ordinary rubber goods, will now have completely gone to the bottom. Decant off the upper clear solution before it gets too cold, and in the same manner repeat the washing by petroleum benzene once more. Then add a mixture of acetone and chloroform (equal parts by weight, specific gravity 1.029), heat to boiling on a steam oven, taking care to prevent bumping, and centrifuge as before. By decanting or siphoning remove the washing liquid carefully. Repeat the washing process thrice more, then dry flask and weigh.

This method is based on the fact that at high temperatures melted paraffin dissolves soft rubber compounds easily and at the same time acts to change the rubber into a resinous substance which embraces the minute particles of inorganic fillers suspended in the upper layer of melted paraffin and precipitates them to the bottom. This decomposition of rubber by the action of paraffin seems to increase according to the temperature and the time of heating to some extent. However, as this decomposition product of rubber can be actually removed by means of repeated washing with the acetone-chloroform mixture there is no danger leading to higher results than the real amount of mineral matter.

Judging from this action of paraffin on rubber hydrocarbon at high temperatures the authors suppose that when used as a softener in rubber goods paraffin may have a similar effect on the rubber and in consequence of this effect solid paraffin compounded with rubber may influence unfavorably the technical quality of the rubber goods.

Rubber Molecule's Great Weight

THE long suspected great weight of the rubber molecule can now be said to be measurably determinable, according to Nicholas Bacon, who, in the *Journal of Physical Chemistry* (London), makes a comprehensive survey of the theories formulated and the work done to elucidate the nature of vulcanization. The conclusion is inevitable, he says, that the union between rubber and sulphur is a chemical one, quite as C. O. Weber maintained in his classical researches, and that the Ostwald theory of adsorption and that of Ostromislenski of chemical union and adsorption are altogether untenable. While the Weber theory explains well the gradual change in physical properties with progressive vulcanization, he holds that it must be modified to account for the fact that it is possible, using ultra-accelerators, to vulcanize rubber with coefficients of vulcanization much lower than the 2.29 per cent sulphur that Weber had assumed for his initial compound with a molecular formula of $(C_5H_8)_{20}S$; and hence it is necessary to seek a new leader for an analogous series of compounds.

In estimating the proper size for the caoutchouc molecule, the idea of a gigantic one may be discarded, homogeneity having proved it to persist with vulcanizates containing as low as 0.1 per cent of sulphur, nevertheless it is considered conservative to postulate that the molecular weight of the caoutchouc is at least 32,000 in order to account for the initial compound of a series that would extend up to a compound containing 32 per cent of sulphur. Such initial compound must account for a sulphur content of 0.1 per cent. Hence its formula would be about $(C_5H_8)_{320}S$. Thus is the value of n in the general formula $((C_5H_8)_nS$ greatly increased and the compounds formed are shown to be much more closely related to each other than they were in Weber's original series.

Third Plasticity Symposium

THE third plasticity symposium was held Dec. 17, 1928, at Lafayette College, Easton, Pa. The attendance included chemists and representatives of industrial organizations and educational institutions. The symposium was held jointly by the Lehigh Valley section of the American Chemical Society and the research committee of Lafayette College.

¹"On the Determination of Inorganic Matter in Soft Rubber Goods." No. 234. Researches of the Electrochemical Laboratory, Kiyoshi Takatsu, director, Ministry of Communications, Tokyo, Japan.

American Rubber Technologists

EDWIN OSGOOD UPHAM, chem. b.

May, 6, 1891, Keene, N. H.; five years electrical chemistry M. I. T.; clerk, Keene Glue Co., Keene, N. H., 1914-15; student, production clerk on clothing, American Rubber Co., Cambridge, Mass., 1915-18; head of central planning dept., footwear div., U. S. Rubber Co., 1918-21; acting supt., Boston Rubber Shoe Co., Malden, Mass., 1921-22; production supervisor, footwear div., U. S. Rubber Co., 1922-25; production engr. genl. div., U. S. Rubber Co., 1925-28; genl. mgr., footwear and miscellaneous factories, U. S. Rubber Co. since 1928. Address: U. S. Rubber Co., 1790 Broadway, New York, N. Y.

Willard L. Morgan, chem. b. Jan. 10, 1902, Wilmington, Del.; graduate Wilmington High School, Latin scientific course, 1921; Goldie Bus. Coll., Wilmington, Del.; B. S., M. I. T., 1923-4; M. S. in colloidal and physical chemistry U. of Calif., 1926; main exper. station, E. I. du Pont de Nemours & Co., Wilmington, Del., 1918-22; teaching fellow in organic chem. U. of Calif., 1925-6; research chem. on latex, genl. labs., U. S. Rubber Co., 1927; organized new laboratory in charge of research and development for manufacture of inner tubes directly from latex, U. S. Rubber Co., Detroit, Mich., 1928; research director, Triplex Safety Glass Co. of No. America, Clifton, N. J., 1928. Author: Emulsification by Solid Powders and the Determination of Contact (Wetting) Angles, with Joel Hildebrand in *J. Phys. Chem.* p. 1,566, 1927; research on direct production of rubber goods from latex. Member: Am. Chem. Soc., Sigma Xi, Phi Lambda Upsilon, Chi Pi Sigma. Address: Triplex Safety Glass Co. of No. America Clifton, N. J.

Ernst Alexander Grenquist, chem. engr. b. 1899, Abo, Finland; U. of Helsingfors, Finland, U. of Abo, Finland, chem. engr., 1923; chem. lab. Ministry of Defense, Helsingfors, Finland, 1923-24; chem. lab., Highland Hospital, Rochester, N. Y., 1924-26; dept. of foreign literature, Am. Medical Assn., Chicago, Ill., 1926-27; chem. lab., Fisk Rubber Co., Chicopee Falls, Mass., since 1927. Author: Research on structure of complex molybdenum salts, biochemistry of white fir, smokeless gun powder, physical chemistry of bacteria and rubber. Member: A. C. S. Address: 31 Maple St., Springfield, Mass.

Harold S. Liddick, chem. engr. b. Sept. 7, 1902, Lewisburg, Pa.; B. S. in chem. engr., Bucknell U., 1924; electro. chem., Westinghouse El. Mfg. Co., Pittsburgh, Pa., 1924-25; asst. chem., Faultless Rubber Co., Ashland, O., 1925-28; chf. chem., Seiberling Latex Products Co., Barborton, O., 1928. Member: A. Inst. of Chem., Phi Theta Sigma, Beta Kappa. Address: 107 W. Lake Ave., Barborton, O.

Percy Leslie Bunker, supt. b. 1880, London, Eng.; Dr. Herniman's, Westminster, junior matriculation, Mosley Coll.,

Technical superintendents, chemists, process and development engineers in rubber manufacturing and reclaiming plants, research, testing and service laboratories are invited to send their biographical data to us for publication

London, Eng.; representative of Fandels, Ltd., London, Eng., 1905-13; Coast Tire & Rubber Co., Oakland, Calif., 1920-22; supt. inner tube dept., Sturgis Tire & Rubber Co., Oakland, Calif., 1923; supt. inner tube and accessories dept., Gregory Tire & Rubber Co., Port Coquitlam, B. C., since 1923. Address: 209 Carrarvon St., New Westminster, B. C., Canada.

John T. Kidney, mgr. b. Dec. 15, 1880, St. Johns, Newfoundland; St. Patricks High School, Cleveland O., mgr. industrial dept., Mrs. Bureau, Cleveland, O., 1907-15; appraisal work, Cleveland Electric Illuminating Co., 1915-16; mgr. plant protection, Goodyear Tire & Rubber Co., Akron, O., 1918-27; mgr. Employees' Service Div., since 1927. Member: E. Akron Bd. of Trade, Akron, O., Chamber of Commerce, Akron, O., pres., Summit Co. Safety Engrs. Soc. Address: 1355 Sprague St., Akron, O.

Arthur H. Lewis, engr. b. Nov. 28, 1881, Hutchinson, Kan.; Armour Inst. Tech., Chicago, Ill., undergraduate class of 1904 in mechanical engineering; automobile sales 1907-13; branch sales mgr., U. S. Rubber Co., Hutchinson, Kan., 1913-22; dist. mgr. U. S. R. Co., Kansas City, Mo., 1922-27; southwestern mgr. U. S. R. Co. in charge of St. Louis and Kansas City districts since 1927. Member: Masons. Address: U. S. Rubber Co., Kansas City, Mo.

Eugene M. McCole, chem. b. Aug. 28, 1900, Bloomington, Ill.; B. S., U. of Ill., 1922, M. S., 1923; Ph. D., Columbia U., 1927; Glidden Co., Cleveland, O., 1923-4; technical sales dept., B. F. Goodrich Co., Akron, O., 1924-5; research and asst. in org. chem., Columbia U., 1925-7; research chem., U. S. Rubber Plantations Co., Boenot, Kisanan, Sumatra, East Coast. Author: Junior author with Fisher of two rubber papers. Junior author with Bogert of paper on synthetic drugs. Member: Am. Chem. Soc., Phi Lambda Upsilon, Sigma Xi, Beta Theta Pi. Address: Plantation Research Dept. U. S. Rubber Plantations Co., Boenot, Kisanan, Sumatra, East Coast.

Martin Andrew Moore, supt. b. Youngstown, O.; high school; Republic Rubber Co., Youngstown, O., 1906-17; Brunswick Balke Co., Muskegon, Mich., 1917-24; supt. Gregory Tire & Rubber Co., Port Coquitlam, B. C., since 1925. Recently completed study of New Zealand

road and climatic conditions with references to tires. Address: Port Coquitlam, B. C. Canada.

Bradford Noyes, Jr., physicist, b. 1895, Charleston, W. Va.; B. S. (Eng.) W. Va. U., 1920; M. S., 1922 and Ph. D., 1924, Cornell U.; major in experimental physics, minors in alternating currents and physical chemistry; instructor W. Va. U., 1919; instructor, Cornell U., 1920-24; physicist, Taylor Instrument Cos., Rochester, N. Y., since 1924; research on electrical resistance of carbon and graphite as function of temperature; temperature measuring and recording instruments. Member: Kappa Sigma and Sigma Xi. Address: Taylor Instrument Cos., Rochester, N. Y.

Harold W. Penfield, chem. b. Aug. 1, 1890, Waterville, N. Y.; Ph. G., U. of Buffalo, 1911; B. S. U. of Buffalo, 1923; rubber chemistry one year at Akron U.; Diarsenol Laboratories, 1922-4; technical staff, Hewitt-Gutta Percha Rubber Corp., Buffalo, N. Y. since 1924. Member: Beta Phi Sigma. Address: 544 Highgate Ave., Buffalo, N. Y.

W. Kenneth McPherson, chem. b. 1904, Des Moines, Ia.; Coe Coll.; B. S., Parsons Coll., 1925; asst. U. S. Food & Drug Lab., New York, 1925; sales dept., B. F. Goodrich Co., New York, 1926; compounder, Akron, O., 1927-8; technical staff, Hewitt-Gutta Percha Rubber Corp., Buffalo, N. Y., 1928. Member: Alpha Kappa Chi; Theta Alpha Phi; Alpha Delta, Orio. Address: 240 Kensington Ave., Buffalo, N. Y.

Harold Bickford Leland, chem. engr. b. Aug. 31, 1895, Somerville, Mass.; B. S. in chem. engr., Tufts Coll., Medford, Mass., 1917; sailor U. S. N., 1917-19; chem. lab., Hood Rubber Co., Watertown, Mass., 1919-22; production dept. in various capacities same company since 1922. At present divisional supt. of milling and reclaiming dept. Member: Masons. Address: 20 Clarendon Rd., Belmont, Mass.

Edwin Joel Thomas, supt. b. April 27, 1899, Akron, O.; U. of Akron; Goodyear T. & R. Co., Akron, O., lab. stenographer, 1916-18, secy. to Paul W. Litchfield, 1918-20, asst. to factory mgr., 1920-22, mgr. flying squadron, 1922-26, asst. to president and mgr. personnel dept., 1926-28; genl. supt. and director, Goodyear T. & R. Co. of Calif. and director of Goodyear Textile Mills, Los Angeles, Calif. Address: 2632 Raymond Ave., Los Angeles, Calif.

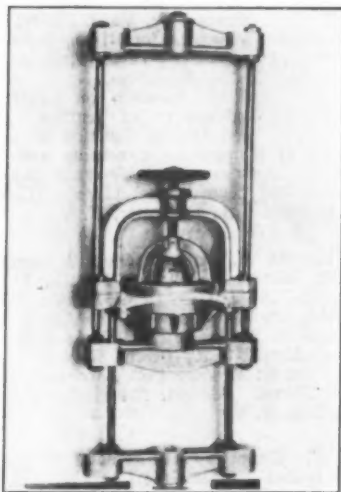
Joseph P. Maider, chem. b. Aug. 16, 1887, Phoenix, N. Y.; B. chem., Cornell U., 1911; city chem., Spokane, Wash., 1911-17; successively in chem. and phys. lab., tire compounding and mgr. plant control sub-division, Goodyear T. & R. Co., Akron, O. since 1917. Member: Sigma Xi, Akron Exchange Club, Rubber Division, Am. Chem. Soc. Address: 888 Orlando Ave., Akron, O.

New Machines and Appliances

Strength Tester

For Knit Goods

A NEW attachment to test burst strength of knit goods by the ball and ring method has recently been perfected. Heretofore, manufacturers of



Scott Knit Goods Tester

knit goods were obliged to depend for strength tests on machines employing rubber diaphragms and the standards arrived at showed a marked divergence of opinion, due in no small part to the eccentricities of the rubber diaphragms.

The new attachment fits on to many of the standard Scott testers. The two major parts replace the regular tensile strength testing jaws. The conversion of the Scott tester from a tensile to a burst strength and vice versa is a matter of but a few minutes.

The upper part of the device containing the bursting ball receives the tension of the inclinable balance. The lower half moves downward with the pull of the testing machine screw. This section of the attachment contains the ring, through which the fabric is forced by the bursting ball, and a clamping device with which to fasten the fabric and hold it taut.

To operate the attachment the section of knit goods is laid on the clamping base, the testing ring is lowered by means of a screw wheel holding the fabric securely. The screw mechanism of the testing machine pulls the fabric and ring down on to the ball until the fabric is broken or burst. The bursting strength is indicated

on the dial of the machine or the serigraph recording sheet.

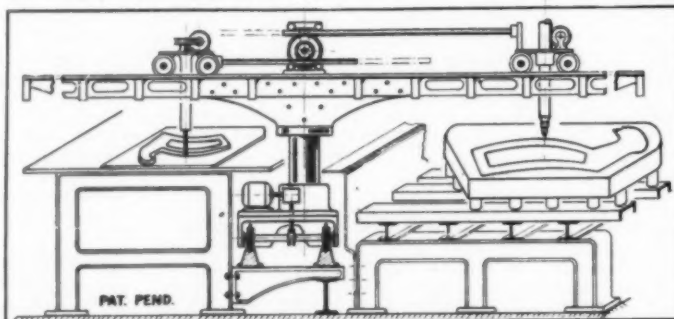
Extensive experimentation proved that a 1-inch ball and a 1 3/4-inch ring gave the best results, therefore, those sizes were adopted. There can be absolutely no depreciation, reduced strengths or eccentricities of the testing parts. They are constructed entirely of metals with nothing to wear or break.

Any company equipped with most models of Scott-testers needs only the addition of the new ball-burst attachment to further equip its plant to test knit fabrics.—Henry L. Scott Co., Providence, R. I.

Shape Cutting Machine

METAL shapes or templates are a standard requirement in certain processes of the rubber manufacturing industry, as for example in patterns for hand or machine cut shoe parts, templates for cutting dies, molds, etc.

An automatic cutting machine designed for the execution of such work in heavy and light forms comprises a tracing section and a cutting section as indicated in the illustration. The movement of the tracer is transmitted to the cutting torch and engages instantly, forcibly, and without the possibility of ever developing lost motion. All moving parts are well balanced and substantially supported so as to keep in their plane permanently. This is an unique feature of all the designs and the reason for their unprecedented success. Reproduction is exact for years



Geweco Universal Large Type Automatic Shape Cutter

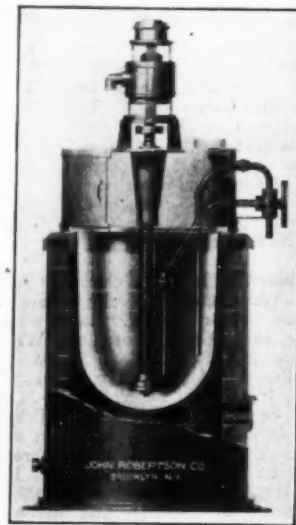
and maintenance is negligible.—General Welding & Equipment Co., 66 Brookline Ave., Boston, Mass.

New Lead Melting Pot

LARGE capacity lead encasing presses used by the electric cable and rubber hose industries require lead melting pots having a correspondingly large capacity with facilities for easily handling a great quantity of molten metal. For this purpose the lead melting pot herewith shown in the illustration has been developed.

This melting pot, instead of being

equipped with the ordinary valve seat and hand-operated valve mechanism, is equipped with a motor-driven centrifugal pump having a capacity for pumping 2,000 to 2,500 pounds of lead per minute. The pump is



Robertson Lead Pot

supported in a housing with special bearings and is connected by means of a flexible coupling with the vertical motor, which, in turn, is mounted on top of the hood. Both the furnace and hood are lined with insulating material and in addition to this

the furnace is lined with circular firebricks, the base of the furnace being arranged so that any type of gas or oil-burner selected can be used.

The lead pump is designed to operate continuously so that the lead in the pot will be in continuous motion. The lead is drawn off to the extrusion press by means of a special stop valve mounted on the side of the hood. This pot, in addition to delivering

lead to the press, serves as an agitator for antimonial lead and makes it possible to maintain more uniform temperature in the lead pot. The lead pot shown has a holding capacity of 20,000 pounds. Similar lead melting pots have been made with double valve equipment so that lead can be delivered to two presses at one time.—John Robertson Co., Inc., 131 Water St., Brooklyn, N. Y.

DURING THE FIRST HALF OF 1928 TIRE fabrics, other than cord, to the amount of 5,143 sq. yds., value \$2,427, were exported from the United States to Argentina.

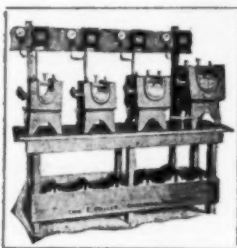
Hard Rubber Pumps

HARD rubber pumps have been of great assistance in the advancement of the chemical industry because they have made possible the handling of strong corrosive liquids safely and economically. Their use is in no sense a recent development for the American Hard Rubber Co., 11 Mercer St., New York, N. Y., built its first hard rubber pump in 1876. This was a 4 1/4 by 10 inch double acting steam driven pump. In 1892 two pumps made by the same company were used in the aquarium of the World Columbia Exposition in Chicago.

Ever since the first pump was built, improvements in design and construction have been continually made to keep pace with modern industrial methods. One of the latest and most popular types of hard rubber pumps is the centrifugal pump. This pump has a capacity of 200 gallons per minute; suction 3 inch, discharge 2 inch, and speed of 1,750 r. p. m. Reciprocating, single and double acting, gear pumps, steam, belt and motor driven pumps are also built for regular service.

Electrical Sectional Molds

A GROUP of electrically heated sectional tire repair molds is here pictured. This is an automatically controlled



Miller's Tire Unit

vulcanizer for balloon and high pressure tires. It comprises four individual sectional molds, each operated independently and heavily insulated. The latter is a special feature. The special automatic control gage has long been in use on electric tube vulcanizers of the same makers.—Charles E. Miller, Anderson, Ind.

Pulleystone

A NEW preparation for increasing the traction of transmission belting on pulleys, known as Pulleystone, is said to be the only material that can be applied to iron, steel or wooden pulleys for the elimination of belt slippage and the increase of the coefficient of friction and transmission capacity of the belt.

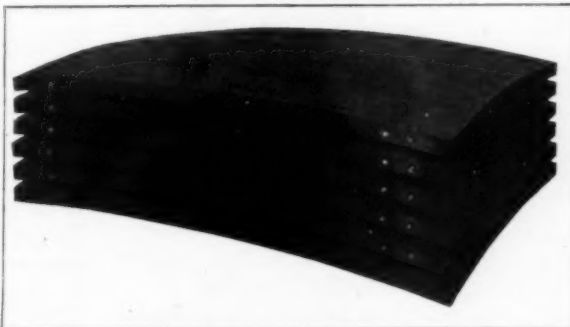
Although a stone it is not abrasive, and when the pulleys are cleaned and the material applied according to instructions it does not fail to give desired results. Paper pulleys are the only kind for which it is not applicable. Neither can it be used on a wooden pulley so soaked in grease that its surface cannot be cleaned.

Pulleystone is laid on and smoothed out by hand with warm water. Repeated coatings may be made over the first one for re-

newal.—Chicago Belting Co., 113-25 N. Green St., Chicago, Ill.

Curved Press Platens

ROLLED steel steam platens with polished surfaces of flat form are well known to manufacturers of rubber goods. Recently these platens have been



Southwark Curved Steel Platens

introduced with surfaces curved in two directions as here pictured, the contours being made to conform to any curve the user may specify. These plates will fill a much needed want among manufacturers who mold fibrous or plastic material to special shapes. They offer the same mechanical advantages that are found in the well known flat steel plates.

Accuracy of section gives even heating, fast cooling and perfect drainage, resulting in the utmost uniformity of product. The polished surfaces and steam and water circulating passages in these curved platens are exactly the same as used in standard flat platens. The platens illustrated are 50 by 60 inches but can be furnished in any size, shape or contour.—Southwark Foundry & Machine Co., Philadelphia, Pa.

Folding and Crimping Machine

THE machine here pictured, designed for folding and crimping the edges of fabric, is applicable to the work of apply-



Singer Rubber Crimper

ing strips of rubber in the manufacture of bathing caps, etc. The machine has no stitching mechanism, being especially designed for folding and crimping raw edges

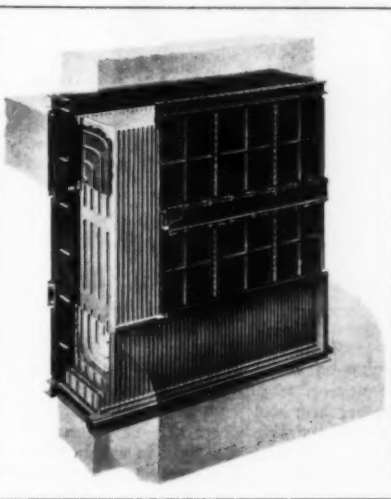
of rubber sheet at one operation.

The crimping is accomplished by means of a crimping pinion located above the work and a corrugated crimping wheel below the work. When the crimping pinion is lowered upon the work, pressure on the pinion is exerted by means of a spring and the folded edge of the fabric is crimped as it is fed through the machine. The machine can be driven by hand as well as by mechanical power, a convenient arrangement being fitted to the large balance wheel for this purpose.—The Singer Sewing Machine Co., 149 Broadway, New York, N. Y.

Combustion Air Preheater

THE heat recovered from waste gases returned to the furnace of a boiler has a certain value. Also the improvement in combustion and furnace conditions due to preheated air has a further value.

These two items may represent as much as 10 per cent improvement in overall plant efficiency but complications of plant oper-



C. E. Air Preheater

ation and the maintenance of masses of moving parts need not be a part of the price.

The air preheater here illustrated has no moving parts, nothing to wear out or to get out of order. It is of the plate type and employs the counter-flow principle which insures maximum heat transfer from the waste gases to the combustion air. The air entering at the point from which the gases leave encounters an increasing temperature as it progresses through the preheater and consequently absorbs the maximum amount of heat. The temperature difference between gas and air is thus maintained at a practically constant ratio.—Combustion Engineering Corp., 200 Madison Ave., New York.

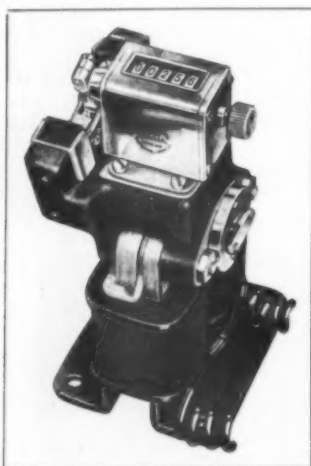
THE NETHERLANDS EAST INDIES Government authorized a syndicate at Banjarmasin, Borneo, to manufacture native-grown rubber.

Magnetic Counters

COUNTERS are the generally accepted means for securing accurate information for maintaining the speed of machinery, measuring machine output and the endurance of tires and other goods undergoing mechanical tests. The present illustration pictures a U. S. magnetic counter operated electro-magnetically for alternating current only. A second form known as the U type will work satisfactorily on direct current only using dry cells, storage battery or generated current.

With an 80 ampere hour storage battery with the time of contact of commutator or circuit breaker adjusted to the minimum required to operate properly, the small U magnet counter should run to 5,000,000 and the large magnetic counter to 10,000,000 counts on one charge.

The magnetic counter is essential where it is placed at some distance from the ma-



Veeder U. S. Counter

chine on which the count is to be taken. A number of counters can be grouped together in a central or convenient place. It is also desirable where articles counted are very small or thin or light in weight, making it difficult to count by mechanical means.

Because no extra contact device need be provided, the magnetic counter is especially useful in conjunction with other devices already electrically operated, where it is desired to know the number of times these devices are started or stopped, such as elevators. In such cases, the counter (provided it is furnished with coils wound to suit) could be connected in shunt or in series with the device in question.—The Veeder Mfg. Co., Hartford, Conn.

Factory Ventilating Fan

IN every rubber plant there are places where operatives work to disadvantage because of lack of proper ventilation for the removal of uncomfortably warm air or fumes and dust arising from processing stock. Under such conditions a ventilating fan of exceptional efficiency will prove to be a paying investment and not an expense.

The motor driven fan wheel here pictured is actually a true screw propeller moving

the air currents in a solid, straight, cylindrical column.

In most ventilating jobs dust, dirt, grease, acids and vapors are mixed with the air moved, therefore the windings, bearings and commutator of the motor are completely



Wing Screwplex Fan

protected from harmful action of the foreign materials being exhausted. The motor itself is larger than a non-enclosed motor so that it can perform continuous duty without overheating. Motor, fan and mounting frame are joined and connected in such manner that the unit formed is strong, compact and vibrationless.—L. J. Wing Mfg. Co., Newark, N. J.

Boot and Patch Skiver

THE skiving machine here pictured is of the former well-known type modified and improved in many particulars to maintain it in line with the prevailing high efficiency demands in rubber work such as tire reliners, boots, patches, etc. There are several items of improvement noted in the latest development of the skiver here illustrated. These reflect the advance in design of this machine due to 25 years of skiving in manufacturing work, and are as follows: Attachment for quick vertical adjustment of the guide roller; the arm is lifted to the back of the machine, leaving the work table surface clear; drive of upper guide



S A S Tire
Boot and
Patch Skiver

roller is raised clear of the table; removable guide plate for changing to internal and grooved work; ball and socket shaft fixed to machine for easy removal of feed roll bracket; eccentric lever for rapidly lifting the spring tension arrangement; adjustment for weak and strong spring ten-

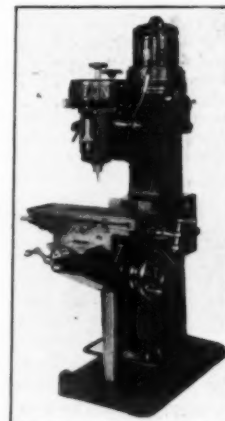
sion without changing the spring; the guide roller can be swivelled at its lowest point thus simplifying its adjustment; rotating knife ground in the machine whilst working saves time of removal and ensures permanent and correct cutting; feed roll bearing with shortened lever enables free exit of skivings; the knife grinding emery wheel is driven by a flat belt, automatically kept at correct tension by a spring, thus giving reliable and durable service.—Manufacturers Supplies Co., 720-32 N. 18th St., St. Louis, Mo.

Vertical Milling and Routing Machine

THE No. 8-D vertical milling and routing machine recently announced by the George Gorton Machine Co., Racine, Wis., is the latest addition to its line of

die - sinking and engraving machines.

The machine is specially adapted for handling economically, die, tool room and rubber mold work and routing in brass, steel or cast iron. It is designed to run small cutters at high speeds, for work now commonly performed on large plain milling machines with high speed attachments.



Gorton Milling Machine

A feature of this machine is the sliding head. This unit carries the spindle and drive complete. With head close to the column the gap between spindle and column is 15 inches. With head fully extended, the gap is 30 inches, making the area covered by table movement 15 inches by 22 inches; all at one setting of work. The machine will also swing a plate 60 inch diameter by 4 inches thick, or a cylinder 22 inch diameter by 15 inches high. Although built primarily for precision work, this is a rugged tool, and will operate a half-inch diameter high speed steel cutter to the limit.

A spindle pulley brake facilitates cutter changes. It is possible to stop the machine at any speed and change cutters, all in ten seconds, without jar or chatter. Spindle is completely enclosed, ball bearing, running in oil. It is machined from a solid bar of chrome manganese alloy steel hardened and ground inside and out, with splined drive. It is mounted in a high carbon steel sleeve, hardened and ground inside and out, and sliding in a hardened ground steel bushing.

New Goods and Specialties

Intriguing Balls

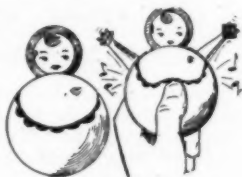


Indian Tongue Ball

Novelties which form endless amusement to the small child and will keep him quiet for hours are shown in the illustrations. The Indian tongue ball is four inches in height and is made of rubber. Painted in appropriate colors, when squeezed the tongue pops out.

The painted rubber ball doll has a brightly colored celluloid head attached. When pressed two rubber arms and hands will pop out and a loud squeaking sound is then produced. The doll is just three inches in height and light to handle.

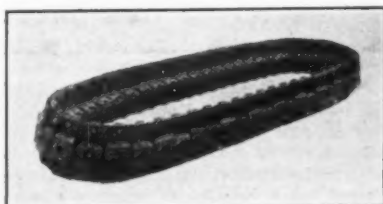
Besides furnishing amusement to the youngsters, these balls are likewise a source of fun for the grown-ups and are popular as favors for dinners, smokers, etc. The manufacturer is Oscar Leistner, Inc., 323 W. Randolph St., Chicago, Ill.



Ball Doll

New Creeper Track for Truck

At the recent Paris truck show important changes were noted in the creeper track used on the Citroen-Kegresse tractor. Originally this was an all-rubber construction, but it now consists of a thin endless band of rubber and canvas carrying a series of rectangular steel plates. Each plate is held in position on the band by three bolts, the center bolt being countersunk on a block of rubber in contact with the road and also holding a tongue of rubber on the inner face, which acts as a guide. The two lateral bolts each hold a small block of rubber engaging with slots cut in the face of the driving pulley, and thereby assuring a positive



Citroen-Kegresse Track

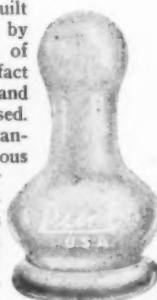
drive. The band retains all its original flexibility, but by reason of its armor plating and the detachable blocks of rubber it is more economical to produce and to maintain. It is claimed that this tractor has been adopted by the French military for hauling 75 mm. guns.

Semi-Hardened Rubber Buffers

Buffers, mudguards and the like made of semi-hardened rubber are being offered in attractive colors. They can be returned to their normal condition when dented, and may be reinforced, if desired, by a pliable and unbreakable armature.

Transparent Nipples For the Baby

Exclusive quality is built into the Pur-O nipples by their special process of manufacture and the fact that only the cleanest and purest rubber is used. The manufacturer guarantees that no poisonous fillers or ingredients which might jeopardize the baby's health



Ring Rolled



Banded

are used, and the nipples conform to every standard and recommendation of baby health authorities.

An innovation which has met with a popular reception is the new style manufactured with a ring rolled base. It is made in both ball top and household shapes.

The contrast between the glossy black base and clear transparent body of the banded style nipples, shown in the illustration, gives them a very attractive appearance. These, two, are made in both the ball top and household shape, the latter ribbed.—The Lion Rubber Co., Ravenna, O.

Tea Apron

Green, old rose, light blue and lavender rubber on a cream rayon background with Dresden design are the combinations of colors used in the very charming tea aprons of which the illustration is a sample.

The pure gum rubber skirt is shirred to the long waistline yoke of the rubber-coated rayon and harmonizes with the full skirts of the present mode. The basket pocket—a combination of rubber and rayon—decorates the right side and is made more attractive by a rubber ribbon bow tied jauntily to the handle. The aprons may be had either individually boxed or in bulk packing.—The Omo Mfg. Co., Inc., Middletown, Conn.



Dresden Apron

Pneumatic Upholstery

A simple and adjustable means of providing maximum seating comfort, irrespective of the driver's or passenger's weight, the Scaco self-controlled air cushion insulates against all road shocks. It is a really hygienic form of upholstery which, the manufacturer affirms, will be as efficient after five years' service as when new. There is no possibility of sagging with a Scaco fitted seat, no uncomfortable lumps and hollows, the construction insuring that wherever the weight is applied it is spread evenly over the whole area. Any desired pressure can be instantly provided by the use of a hand pump, though as a very low pressure only is required, the cushion may be easily inflated with the mouth. The leather covering can be easily detached and the whole upholstery dismantled for cleaning.—The Self Controlled Air Cushion Co., Ltd., Clifton St. Works, Newton Heath, Manchester, England.



Scaco Cushion

For additional information regarding these articles write New Goods Dept., INDIA RUBBER WORLD, 420 Lexington Ave., New York, N. Y.

Dish Mop

One of the principal advantages of the Soap-Flow mop is that it completely does



Soap-Flow

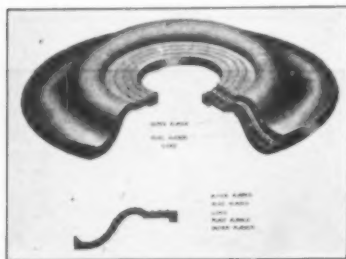
away with the dishpan and eliminates the need of putting the hands in hot, greasy, dirty water. A detachable, perforated rubber cap filled with soap and placed on the end of the handle creates an instant flow of suds and prevents marring of fine china while serving as a scraper. Odds and ends of soap may be used. The handles are lacquered in the bright colors so prevalent in the modern kitchen.—Soap-Flow Mop Co., 821 Calvert Bldg, Baltimore, Md.

Pump Diaphragm

Because of the exacting conditions required of the rubber diaphragm of a pump, engineers, particularly hydraulic engineers, have been clamoring for some improvement which would make for increased efficiency and longer service. In the Hughes' patent valve, the Reliance Rubberware, Ltd., 39-40a, Aldersgate St., London, E. C. 1, Eng., believes that this deficiency is overcome.

The diaphragm is constructed of natural colored rubber combined with colloidal zinc, colloidal antimony and the finest antioxidants. The valve is reinforced with strong tire cord fabric which has been impregnated with rubber in a latex bath. The cord is not simply embedded in the rubber, but is placed within two layers of pure transparent rubber which gives it the flexibility necessary for its particular use and strenuous service. The combined parts of the valve are carefully made up by hand, and the whole is vulcanized in heavy steel molds under a pressure of 200 tons.

The manufacturer has received the most favorable reports as to the service these valves perform, and claims their use in tropical countries invaluable because of their resistance to extreme climatic conditions.



Hughes' Patent Valve

Gold Bond Tire

A new extra service tire for passenger cars, the Gold Bond Balloon, is announced by the Ajax Rubber Co., Trenton, N. J. This tire is warranted for eighteen months, while used on a passenger car, against blowouts, cuts, bruises, wheels out of alignment, underinflation, accidents and any other road hazards that may render the tire unfit for further service.

Tire Valve Caps

A molded rubber cap to fit over the tire valves is a recent offering of F. A. Wilkinson & Partners, Ltd., Gretton, near Kettering, Northants, Eng. A rubber ring holds the cap securely in place.

Stylish Gaiter

A light weight fashionably designed gaiter has been recently placed upon the market by the Firestone Footwear Co., Hudson, Mass., which has been in great demand since its appearance on the market. This featherweight 3-snap Ritz is tailored to fit the ankle and is equally serviceable for either rain or snow. The gaiter is



Ritz

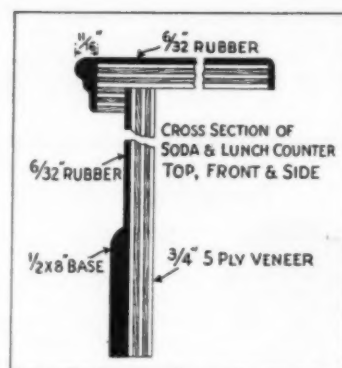
made in brown and gun metal, the two most popular shades for footwear of this character.

Hot Water Bottles in Pastel Shades

The popular demand for bright colors has been recognized by the Davol Rubber Co., Providence, R. I., by the addition to its general line of hot water bottles of the new Paris numbers in beautiful shades of blue, green and rose. All of these bottles are equipped with the non-losable stopper. An added innovation is the suggested list of uses which are ranged under a heat and cold imprint, which serves as a direction in times of emergency.

Flower Pots and Vases

Vases and pots for cut flowers are made of rubber which is stiffened by using harder rubber for the walls or by vulcanizing or reinforcing the walls with canvas or like durable material, either imbedded in the material or wound spirally on the outside.



Sunne Top

Molded Table Top

The increasing use of warm, colorful tiles on lunch and soda fountain fronts demands a like cheerful appearance of tables and stools. The Charles G. Marks Co., 5 Fountain St., Waukegan, Ill., furnishes molded rubber tops for tables and counters which are made up according to specifications. These Sunne tops eliminate the old noisy, chipped and broken tops replacing them with noiseless, sanitary and colorful covers, equipment which is both durable and harmonious to the general scheme of decoration popularly adopted.

Powder Puff

A novel use for rubber is as a filler for a powder puff. A soft pliable container covers the sponge rubber filling, and is provided with an opening for exchanging the filler.

Rubber-Namel

Calcutta Rubber-Namel may be used by any one to paint a shabby looking car or to renew old pieces of furniture. It contains pure rubber which makes it elastic and will not crack or check with changing temperatures. It flows out smooth and levels itself. The paint dries hard in twelve hours and sets dust-free in two hours.—Cincinnati Varnish Co., Cincinnati, O.

Lively Rubber Toy

The use of balloons to enliven banquets and other social gatherings has resulted in an assortment of novelties guaranteed to make a strong appeal to the risibilities of the most dignified of guests. A new number of the Anderson Rubber Co., Akron, O., is the Real Duck which is fashioned from a zeppelin type of balloon. The head upon which eyes are printed, is cemented on and pasteboard is used for the large bill. Wooden legs and rubber feet provide the means for standing, and the balloon is secured, after inflation, by a twist-it wood valve.



Real Duck

Editor's Book Table

Book Reviews

"The Realm of Rubber," being a record of existing conditions in the rubber industry. By H. H. Ghosh. Publisher, J. B. Daymond, 76 Dhurumtollah St., Calcutta, 1928. Cloth, 266 pages, 6½ by 9 inches, charts and illustrations. Indexed.

This volume affords its readers a concise, systematic account of crude rubber cultivation, its origin, development and present condition. Although written largely from the plantation point of view, it acquaints the rubber goods manufacturer with the important developments that affect the sources of his rubber supply.

The first ten chapters of the book cover the genesis of rubber culture and the essentials of its prosecution, the world's rubber sources and wild rubber in Brazil. Rubber production in India, Burma and Ceylon is discussed, followed by two chapters on diseases and pests of Hevea.

The two closing chapters are devoted to synthetic rubber, the rubber market and statistics on crude rubber.

New Publications

"Salvage & Reclamation Bulletin" is the official organ of the Salvage Division of the National Association of Waste Material Dealers, Inc., the first number appearing Dec. 3, 1928. The book contains twelve pages of interesting matter, half of which are devoted to clearing house offerings. It is issued from association headquarters, Times Bldg., New York, N. Y.

"Reducing the Cost of Electric Power" gives a non-technical explanation of power factor and shows when and how to apply capacitors to reduce electric power cost. The construction of capacitors is also described. The book contains 48 pages and 64 illustrations, and is distributed by the Electric Machinery Mfg. Co., Minneapolis, Minn.

"Hydraulik." This catalog, in English, is presented by Hydraulik G.M.B.H. Duisburg, Germany, whose products, embrace the manufacture of every kind of machine which can be worked by water pressure and also auxiliary machines, devices and apparatus made by the company. The catalog is in loose leaf, bulletin form in binder. Several rubber vulcanizing presses of special heavy construction are illustrated and described.

"Hydraulic Presses for Molding Bakelite, Ebonite and Plastic Materials." This is catalog H7 of Francis Shaw & Co., Ltd., Bradford, Manchester, Eng., in which a number of new and improved presses, semi-automatic and fully automatic are pictured and described; also machines for ebonite grinding, compound mixing, vacuum drying and impregnating.

"Textile Printing Machinery," catalog Number 251, issued by Rice, Barton & Fales, Inc., Worcester, Mass., who has been building printing machines for nearly 100 years. In the several sections of this catalog are illustrated and described straight printing machines for 1 to 14 color work; machines for duplex and intermittent printing in 2, 6 and 14 colors; special printing and forcing machines, machine drives and parts.

Bulletin and model of Yarway floatless Hi-Lo alarm water column and Yarway-Sesure inclined water gage are issued by Yarway-Waring Co., Philadelphia, Pa. The descriptive matter by the sectional operating model of the Hi-Lo alarm water column. This unique model is constructed of cardboard showing the moving parts in the background of a sectional view of the device. A slidable green celluloid sheet actuates the card board mechanism showing realistically the action of the apparatus in service and the visibility from below of the level in the water column glass.

"Rubber." A current practical study of rubber and allied industries issued by Henderson Rubber Reports, Inc., 44 Beaver St., New York, N. Y. This illustrated folder is descriptive of a new loose leaf rubber statistical service of text and charts to be inaugurated with the new year, 1929. This service planned to be complete, concise, accurate and pertinent, will present weekly, monthly, quarterly and yearly basic, current and record charts on crude rubber, cotton, reclaim, stocks and consumption. The service is introduced by a general manual of price factors and market practices of the rubber industry designed as a practical introduction to and reference handbook for the interpretation of the past and current activities of the rubber market.

"Rubber Chemistry and Technology, Nov., 1928." This issue of the Rubber Division journal of reprints is devoted entirely to the paper, "Importance of Temperature and Humidity Control in Rubber Testing. I—Stress-Strain and Tensile Properties." This is the Report of the Physical Testing Committee of Division of Rubber Chemistry of the American Chemical Society, J. E. Partenheimer, chairman.

Rubber & Tyre Review is the new title of the magazine Rubber, published by the Rubber Publishing Co., 103, Tottenham Court Rd., London, W.1, England.

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EFFECT OF FLOUR IN SULPHUR VULCANIZED RUBBER MIXTURES.—R. Ditmar, *Gummi-Zeit.*, 1928, 43, p. 191.

ABSORPTION OF VAPORS BY RUBBER.—S. Reiner, *Kaut.*, 1928, 4, pp. 210-15.

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COVER CROPS AND GREEN MANURES.—B. Bunting and J. N. Milsum, *The Malayan Agricultural J.*, 1928, Vol. XVI, No. 7, pp. 256-280. Illustrated, references.

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THE SOLUBILITY OF SULPHUR IN RUBBER.—Dr. Heinrich Loewen, *Kautschuk*. 1928. Vol. 4, No. 11, pp. 243-249. Illustrated.

PRINCIPLES OF PLASTICIZING.—Dr. Josef Obrist, *Kautschuk*. 1928. Vol. 4, No. 11, pp. 250-252.

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IODINE COUNT DETERMINATION OF RAW RUBBER.—Dr. Adolf Gorgas, *Kautschuk*. 1928. Vol. 4, No. 11, pp. 253-254.

ON CRYSTALLIZED GUTTA PERCHA SENSITIVE TO LIGHT.—Dr. F. Kirchhof, *Kautschuk*. 1928. Vol. 4, No. 11, pp. 254-255.

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Letters from Our Readers

Not Inventor of Tap Stock

57 Chancery Lane, London, Eng.

TO THE EDITOR:

Dear Sir: In the report of my lecture on rubber as a substitute for leather before the New York Group, A. C. S., and published in your November issue, the casual reader might infer that I laid claim to being the inventor of the tap stock, which is not the case. Although I did not make this statement at the lecture, I do think that I have produced black tap stock which is superior to anything else on the market. What I do claim is that, in view of the competition arising in ordinary tap stocks, I have developed a number of novelties which so far are not subject to any serious competition.

First. I have developed a non-marking tap stock. In this connection I might say that I did not suggest as stated in *INDIA RUBBER WORLD* that a tap stock will not mark flooring if properly made. A tap stock made on ordinary lines which is excellent in so many respects, will always mark a floor. What I claim is to have made a non-marking tap stock.

Second. I have developed a brown tap stock which is, I believe, a nearer approach to leather than anything else on the market.

Third. In order to get over non-porosity trouble we have developed in this country a sole of special construction.

Fourth. I think I may claim that the rubber leathers other than the sole leathers, i.e., those used for upholstery, shoe uppers, etc., are certainly of a novel character and in all my travels in the United States I did not meet one dissentient on this point.

One further point. I said that rubber leather was dearer in England than cheap sole leathers, not "good sole leathers."

The above sets forth quite clearly what I claim, but not for propaganda, as I only desire to correct any erroneous impression which might be caused.

December 11, 1928.

P. SCHIDROWITZ.

Ford Brazil Plant to Manufacture Tires

Plants to manufacture tires and other rubber products, it is said, will be established in Brazil by the Ford Motor Co. Possible sites for the factories now being considered are at Boa Vista, Fordlandia, the plantation base on the Tapajos River, 590 miles inland from Para; at Santarem, the limit of navigation for sea-going vessels on the Tapajos during the low water season; and at the port of Para.

Mr. Ford has announced his intention of visiting Para and expressed confidence in the ultimate success of the plantation project. In addition to rubber trees, he said, it is planned to cultivate oil nut trees, cotton and whatever the soil and climate may indicate as profitable.

Legal

APPARATUS FOR MANUFACTURING INNER TUBES. Certain claims for an apparatus for the manufacturing of inner tubes held unpatentable since they merely include various mechanisms to perform independent and unrelated operations on a tube with conveyers to carry the tube from one machine to another, each of which performs its function without regard to the presence or the absence of the other. This application has resulted in Patent No. 1,677,868, Firestone Tire & Rubber Co., assignee of M. A. Pade. Appeal from Examiners in Chief. Decision by Assistant Commissioner Moore. I find no error in the holding of the examiners and I am of the opinion that no invention is involved in broadly providing any machine with a conveyer.

Claims 3, 9, 10, 11, 12, 13, 14 and 15 to 24, inclusive, stand rejected on the ground of aggregation, operations on a tube with conveyers to carry the tubes from one mechanism to another does not set up a proper combination. Claims 4, 5, and 6 stand rejected on the patent to Ross, as these claims fail to distinguish the invention in patentable respects from the Ross patent. I believe these claims are not patentable in view of any tube plant the mandrels are rolled on a table, and conveyors are used, etc. In addition to the patent to Ross, reference may be made to the patent to Moomy in connection with these claims.

The decision of the Examiners in Chief is affirmed.

Patent Suits

FABRIC STRIPPER, 1,402,067, C. D. Hibbs, fabric stripping machine, D. C. Tex. (Fort Worth), Doc. E 517, Rubber Products Co. et al v. Paukey Auto Boot Co. et al. Dismissed Aug. 24, 1928. *Official Gazette*, Vol. 376, No. 3, p. 524.

BRAKE BAND LINING MECHANISM, 1,576,135, Corson & Wright, mechanism for drilling and applying brake band linings; 1,576,138 A. C. McBride, brake band relining machine, C. C. A., 3rd Cir., Doc. 3685, W. A. Wright et al. v. Thermoid Rubber Co. Claims 10, 11, 18, 19, and 20 of 1,576,138 and claims 6 and 10 of 1,576,135 held invalid Oct. 6, 1928. *Official Gazette*, Vol. 376, No. 3, p. 525.

THIN RUBBER ARTICLES, 1,605,445, F. L. Killian, machine for manufacturing thin rubber articles D. C., N. D. Ohio, E. Div. Doc. 2213, P. H. Stevens v. The J. L. Shunk Rubber Co. Claims 1, 8, 9, 11, and 15 to 20, incl., held valid and infringed Oct. 13, 1928. *Official Gazette*, Vol. 376, No. 4, p. 782.

DISH, Des. 56,903, J. L. Wentz, dish or receptacle, filed Oct. 18, 1928, D. C., S. D. N. Y., Doc. E 47/35, J. L. Wentz v. Rubbersan Products, Inc. *Official Gazette*, Vol. 376, No. 4, p. 782.

Treasury Decisions

BALLS, 7039—Protests 18001—G. etc., of Strawbridge & Clothier et al., (Philadelphia). Rubber Balls—Toys.—Colored rubber balls are claimed dutiable at 30 per cent ad valorem under paragraph 1402, tariff act of 1922. Opinion by J. Sullivan. The preponderance of the testimony was found to indicate that the balls are reasonably fitted for other purposes than the amusement of children. They were therefore held dutiable at 30 per cent under paragraph 1402 as claimed. J. McClelland, dissented, citing Abstract 6133. *Treasury Decision*, Vol. 54, No. 19, p. 49.

Chemical Solvent for Metal Cleaning

The chemical solvent trichlorethylene is being used for degreasing metal parts in some European shops. This substance has the chemical formula C_2HCl_3 , boils at 190° F., smells like chloroform, and will not burn or explode. Cleaning is done in three trays, one heated, the intermediate and final for rinsing. The heated tray has a water cooled cover, for condensing the rising vapors. Dirty liquid is regenerated in a simple distillation apparatus.—*Iron Age*.

SHOPMEN, IMPATIENT WITH THE SESQUIPEDALIAN NOMENCLATURE of the rubber chemists, may be more indulgent when reminded that while the latter have been giving us some tantalizing tongue-twisters they have also been greatly reducing health hazard among shopmen. Although aniline is old and has but seven letters, it is rated among the most toxic of accelerators, while piperidonium-pentamethylenedithiocarbamate is young and has forty-one letters it is one of the least toxic of all.

The Midwest Rubber Reclaiming Co.

ORGANIZED in the spring of 1928, the Midwest Rubber Reclaiming Co. plans to begin operations January 1, 1929, at its new plant located in Monsanto Village, St. Clair County, Ill., about three miles from the central business district of St. Louis. Provision has been made for further expansion through the acquisition by the company of twenty acres of land.

The outgrowth of the increased volume

impairs the quality of the finished rubber product. In many cases such products made from large percentages of reclaimed rubber are superior to those manufactured without it. The volume of reclaim which will be used depends largely upon the reclaimer himself. Crude rubber, carbon black, sulphur, accelerators and all sorts of inert fillers and pigments are sold to rigid specifications.



Top—William Welch, President. Right—W. A. Hart, Secretary and Treasurer. Left—S. G. Luther, Vice President and General Manager.

of business enjoyed by The Akron Rubber Reclaiming Co. and its need of a plant located in the Mississippi Valley, the Midwest company was formed with an authorized capital of 24,000 shares of preference stock and 60,000 shares of common stock. A majority of the common stock is owned by the Akron company, and the two organizations are closely allied in their general operations.

The capacity of the Midwest factory will be twenty-five tons a day of finished product, and the plant is equipped to manufacture all standard grades of reclaimed rubber. The main building is 90 by 500 feet, the original investment approximating \$1,000,000, the plant being new and all the machinery and equipment of the latest design.

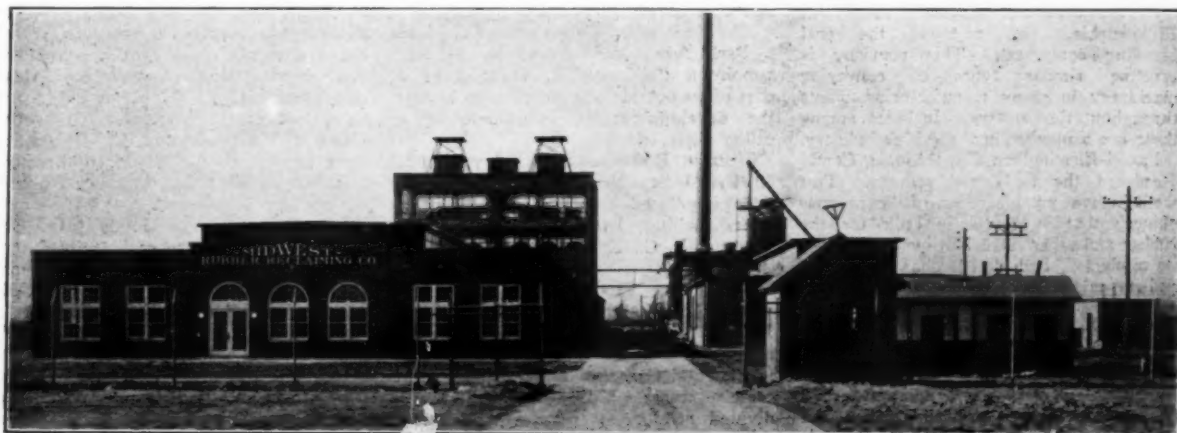
William Welch, president of the com-

pany, entered the rubber industry in 1916 with the Goodyear Tire & Rubber Co. During the latter part of this employment he was in charge of reclaimed rubber sales in which work he became widely acquainted in the trade. In 1923 he resigned and with C. E. Bishop, who had previously been superintendent of the reclaiming division of the Goodyear concern, organized The Akron Rubber Reclaiming Co., becoming its vice president and general manager. The phenomenal growth of the company is explained by Mr. Welch as follows:

"From the start we have adhered to the policy that reclaimed rubber was not a material used to cheapen rubber products. On the contrary, we are firm in the conviction that reclaim is a specific compounding ingredient which, when satisfactorily manufactured and scientifically used, in no way

"Reclaimed rubber, which is a combination of the above materials, can be advantageously substituted only when it is produced to equally close specifications. This is not possible where all sorts of scrap tires are put through the plant without classification or sorting. Uniformity can, however, be obtained by properly sorting the scrap and processing it under accurate formulas and to specifications closely adhered to. This is not a cheap way to make reclaimed rubber, but we find that the compounder today is not so much interested in the price as he is in quality and uniformity.

"There has been no magic connected with our growth. It is simply the result of making the best reclaim we know how, pricing it fairly, treating our customers alike, and, perhaps above all other things, implicitly believing in our product."



Midwest Rubber Reclaiming Plant, Monsanto Village, St. Clair Co., Ill., near St. Louis, Mo.

The resident management of the company will be vested in S. G. Luther, who has spent a large part of his life in the reclaiming industry. His experience dates back to 1910, at which time he entered the employ of the U. S. Rubber Reclaiming Co., for whom he built and operated a reclaiming plant in Russia. In 1913 he became connected with the Philadelphia Rubber Works Co. as factory manager of that company's plant in Philadelphia, and later was placed in charge of its development department in Akron, in which capacity he served from 1919 to 1927 when he entered the employ of The Akron Rubber Reclaiming Co.

Mr. Luther is a graduate mechanical engineer of Worcester Polytechnic Institute. He has personally supervised the erection of the new plant, and his long and varied experience in the rubber industry is sufficient assurance that the Midwest Rubber Reclaiming Co. will have efficient factory management.

W. A. Hart is secretary and treasurer and has been associated with the rubber industry since 1915, at which time he joined the accounting department of the Goodyear Tire & Rubber Co., remaining there until 1924, when he left to become secretary and treasurer of The Akron Rubber Reclaiming Co.

The board of directors include the three officers named and Thomas N. Dysart and Harry Hall Knight, investment bankers of St. Louis; Daniel N. Kirby, attorney-at-law, St. Louis; and W. P. Melton, branch manager, Seiberling Rubber Co., St. Louis.

Builders of Reclaiming Machinery and Plants

The completion of the reclaiming plant of the Midwest Rubber Reclaiming Co. at East St. Louis, makes timely the following references to the contracting and equipment concerns who engaged in its construction and equipment.

The various buildings of the plant were erected by The Austin Co., Cleveland, O., engineer and builder, which specializes in the "Austin Method" of construction.

The equipment and its layout of most modern design, was supplied by the following companies:

R. H. Beaumont Co., 319 Arch St., Philadelphia, Pa., installed the coal handling equipment. This company is erecting similar types of conveying machinery in many manufacturing plants throughout the country. Included among these are a number in the rubber industry.

Farrel-Birmingham Co., Ansonia, Conn., furnished the mills and refiners. This well known manufacturer of heavy machinery that is especially built for the rubber and other industries includes among its products rolled steel platens in all sizes and types for various vulcanizing press purposes.

The Biggs Boiler Works, Akron, O., furnished the entire devulcanizing equipment for this modern plant. The devulcanizing plant comprises 10 units, 6 feet in diameter of electric welded steel, tested on completion to 300 pounds hydrostatic pressure for operation at 200 pounds pressure.

The Electric Motor & Repair Co., Akron, O., representative of various manufacturers of motors and motor control supplies, including induction and synchronous motors, built the switchboards and installed all the electrical equipment.

American Power Piping Corp., contractor and engineer, 804 Merchants-Laclede Bldg., St. Louis, Mo., supplies complete installations of power plant and industrial sheathing and process piping systems. This company furnished all the water, steam, air, oil, and caustic process piping for the mills, devulcanizers, drains and other apparatus recently installed in the new plant.

The Cutler-Hammer Mfg. Co. has moved into its new quarters at 150 Peters St., S. W., Atlanta, Ga. The new location provides warehouse facilities where many types of standard devices will be carried in stock for direct shipment to customers in that territory. This service has been provided because of the increasing electrical power application to industry in that section of the country. A. C. Gibson is manager in charge of the Atlanta office.

The B. F. Goodrich Co. will take over the Hightower tire and fabric's interest in Thomaston, Ga. According to T. G. Graham, vice president of Goodrich, this will make it possible for the company to produce the greater part of its fabric cord tires in its own plants.

Glean Daily has been named general sales supervisor of all of the branches of the Pennsylvania Rubber & Supply Co., Cleveland, O. Mr. Daily joined the Pennsylvania company two years ago as manager of its Akron branch.

The United States Rubber Co., New York, N. Y., elected Henry David of Wilmington, Del., a member of its board of directors to represent the du Pont interests. William Wiseman of Kuhn, Loeb & Co., and Henry Rogers Winthrop of Harris, Winthrop & Co., were also elected to the board.

The Du Pont Cellophane Co. Inc., 2 Park Ave., New York, N. Y., has appointed Frederick R. Downes as a part of its outside organization to handle the development of cellophane as a utility material.

Herron, Rodenbough & Meyer, Inc., 50 Broad St., New York, N. Y., has been appointed agent for W. T. Sargants Rubber, Ltd., 6, Mincing Lane, London, E. C., Eng., for the sale of its rubber.

The Celite Products Co., 11 Broadway, New York, N. Y., manufactures Sil-O-Cel, used for heat insulation; Super-Cel and Filter-Cel, filtration media; and Celite used for settling concrete mixtures. Mirco-Cel, a very finely divided reinforcing pigment, has been developed after four years' research at the company's plant in Lompac, Calif., and will soon be introduced to the trade.

Calcium Carbonate

Comes from Japan

Shiraishi Tsuneji, president of Shiraishi Kogo Kaisha, Ltd., of Kuwana Ekimae, Mieken, Japan, is visiting the United States in the interests of his company, which owns and operates in Japan extensive mineral deposits. This company is the largest manufacturer of calcium carbonate chiefly in the forms of precipitated and colloidal chalk. The company employs 200 workers on its 100 acres of land and 15 acres of factory space. Operations are entirely by water power of which 2,500 horsepower is required.

Eastern and Southern

Vansul, Inc., will occupy the entire third floor at 37-41 Water St., New York, N. Y., due to increased volume of business. The additional space will provide adjoining laboratory and emergency storage.

H. Stuart Hotchkiss, president of the United States Rubber Plantations, Inc., 1790 Broadway, New York, N. Y., will sail Jan. 4 for England and the Far East.

The Rubber Association of America, Inc., 250 W. 57th St., New York, N. Y., has appointed Earl Langstroth manager of its publicity department. Through this department the association will cooperate with the press in the publication of facts, figures and articles of general interest concerning the rubber industry. Mr. Langstroth was formerly publicity manager of The New York Trust Co.

Motor & Equipment Association held its first regular meeting of the executive committee, Dec. 7, at Nela Park, Cleveland, O. C. C. Gates of Gates Rubber Co., Denver, Colo., was appointed a member of the sales development committee.

The J. P. Devine Mfg. Co., Buffalo, N. Y., elected Charles P. Devine president to fill the vacancy caused by the death of Mr. Devine's father. R. K. Weber, who succeeded the late W. C. Arthurs as chairman of the board, announced also the election of H. H. Cust, vice president; C. W. Reynolds, secretary; and D. P. Settlemore, treasurer. David C. Arthurs and P. J. Cooney were elected to the board of directors and Mr. Cooney was appointed assistant to the president.

The Dixie Elastic Goods Mfg. Co., Middlesboro, Ky., recently moved into larger quarters and added new machinery to meet the demand for its Gold Bond athletic elastic products.

Carleton J. O'Neil has resigned his position with the Fisk Rubber Co. to accept one with The Celite Products Co., 11 Broadway, New York, N. Y. Mr. O'Neil is an alumnus of the Worcester Polytechnic Institute and had been connected with Fisk for the past eight years.

Financial and Corporate News

Firestone Annual Meeting

Harvey S. Firestone, Sr., reported to the stockholders of the Firestone Tire & Rubber Co. at the recent annual meeting that net profits for the year ended Oct. 31, 1928, were \$7,072,014. After deducting dividends on the preferred stock, the net profit applicable to the common stock was \$14.66. These profits are shown after writing off heavy losses incurred by the drop in the price of crude rubber from \$.42 to \$.18 a pound. For the year 1928, \$2,955,500 was added to the surplus, bringing the total surplus to \$53,087,300. A dividend of \$2 on the common stock was authorized thus maintaining the annual disbursement at \$8.

The directors elected at the meeting were H. S. Firestone, Sr., J. W. Thomas, S. C. Carkhuff, J. J. Shea, C. A. Myers, Harris Creech, and H. S. Firestone, Jr.

United States Rubber Co.

To the Holders of the Common Stock
of United States Rubber Co.:

You have been advised of the amendment to the company's certificate of organization authorizing the change of the common stock from shares of \$100 par value to shares without par value. The authorized number of shares of common stock is 2,000,000 of which 728,412 are held by the public.

To provide additional capital, thus permitting the retirement of indebtedness and at the same time bringing about a larger proportion of common stock in relation to the senior securities of the company, your directors have voted to issue and sell 728,412 additional shares of common stock of no par value, and to extend to the holders of the common stock the right to subscribe for said additional shares upon the following terms and conditions:

1. The offering of such 728,412 additional shares is made to holders of common stock of record at 3 p. m. on Dec. 21, 1928.
2. The subscription price is \$35 a share, payable in full in New York funds on or before Jan. 11, 1929, at the office of the company at 1790 Broadway, New York, N. Y. Temporary stock certificates will be issued as promptly as possible after receipt of payments.
3. Each stockholder will be entitled to subscribe for one additional share for each share of record Dec. 21, 1928. As promptly as possible thereafter there will be mailed to each stockholder of record a negotiable subscription warrant specifying the number of shares of additional common stock for which such holder of common stock is entitled to subscribe. The subscription warrants will be void after 3 o'clock p. m., New York time, Jan. 11, 1929.

The company has entered into an agreement with Messrs. Kuhn, Loeb & Co. to underwrite the stockholders' subscription for the common stock about to be issued.

The company closed the year 1925 free of indebtedness to banks, as indicated by the annual report for that year. Since then, as the result of violent fluctuations and drastic declines in the market price of crude rubber, the company, in common with all other rubber companies, suffered heavy inventory losses, as explained in the reports to the stockholders, and this has necessitated again borrowing from the banks.

All inventories having been adjusted as of June 30, 1928, to the basis of the market price of crude rubber, which adjustment, as explained in the letter to stockholders dated Aug. 16, 1928, was necessary as a direct result of the action of the British Government in removing restrictions on exportation of crude rubber, the operations for the second six months period of 1928 are resulting in satisfactory profits. Net income for the five months ended Nov. 30 was in excess of \$5,000,000, after all charges in-

cluding interest on indebtedness and provision for estimated depreciation of plants.

The consolidated general balance sheet, showing the position of the company as of Oct. 31, 1928, without giving effect to the additional common stock to be issued, is given on this page.

In the judgment of the Board of Directors the desirability of improving the capital structure of the company through the increase in the amount of common stock outstanding, and the direct benefits that will result from the use of the money at this time for the purpose stated, cannot be over-emphasized.

1790 Broadway, N. Y.
December 11, 1928.

C. B. SEGER,
Chairman.

CONSOLIDATED GENERAL BALANCE SHEET—OCTOBER 31, 1928, UNITED STATES RUBBER CO. AND SUBSIDIARY COMPANIES

Assets	
Cash	\$9,955,368.26
Accounts and notes receivable from customers (less reserves for doubtful accounts).....	49,062,077.22
Accounts, notes and loans receivable, others (current)	2,143,529.06
Total cash and receivables.....	\$61,160,974.54
Inventories of finished goods.....	\$39,591,763.55
Inventories of materials and supplies, including goods in process.....	21,150,684.64
Crude rubber in transit to New York.....	2,423,659.62
Total inventories	63,166,107.81
Total current assets.....	\$124,327,082.35
*Plants, properties and investments including rubber planta- tions, less reserve for depreciation.....	182,649,994.54
Open account with United States Rubber Plantations, Inc.....	6,561,758.97
Securities of affiliated and controlled corporations not included in United States Rubber System.....	5,939,556.16
Securities of other corporations not included in United States Rubber System	1,638,688.64
Common stock of U. S. R. Co. held by a subsidiary company; common stock of U. S. R. Co. held under service contracts and agreements; and notes of employees given for purchase of common stock and secured by such stock.....	6,247,682.13
Prepaid and deferred assets.....	4,702,683.78
Total assets	\$332,067,446.57
Liabilities, Reserves and Capital	
Bank loans	\$21,950,000.00
Accounts payable, including acceptances pay- able for importation of crude rubber.....	17,529,078.57
Drafts and acceptances for crude rubber in transit to New York.....	1,718,640.76
Total current liabilities.....	\$41,197,719.33
First and refunding mortgage 5% gold bonds due 1947....\$69,000,000.00	
Less amount retired through sinking fund	7,644,600.00
	\$61,355,400.00
Less amount held in treasury.....	2,000,000.00
	\$59,355,400.00
Ten year 7½% secured gold notes, due Aug. 1, 1930....\$20,000,000.00	
Less amount retired in connec- tion with sinking fund opera- tions	1,480,000.00
	18,520,000.00
6½% serial gold notes maturing in 15 annual instalments from March 1, 1926, to March 1, 1940	\$30,000,000.00
Less instalments paid.....	6,000,000.00
	24,000,000.00
Canadian Consolidated Rubber Co., Ltd., 6% gold bonds due 1946.....	2,600,000.00
Total funded indebtedness.....	104,475,400.00
Reserves for insurance.....	\$2,378,214.14
General reserves	1,411,931.84
	3,790,145.98
Capital stock—preferred.....\$69,000,000.00	
Less amount held by a sub- sidiary company	3,890,000.00
	\$65,110,000.00
Capital stock—common.....	81,000,000.00
Minority—Dominion Rubber Co., Ltd., stock.....	258,400.00
Total capital stock.....	\$146,368,400.00
Fixed surpluses—subsidiary companies.....	6,677,813.63
Surplus (subject to final determination of Fed- eral taxes for years subsequent to 1917)....	29,557,967.63
Total capital stock and surpluses.....	182,604,181.26
Total liabilities, reserves and capital.....	\$332,067,446.57

*Included in this item are intangible assets of United States Rubber Co. and its subsidiaries, such as good will, patents, etc., representing an investment of about \$65,000,000.

Dividends Declared

COMPANY	Stock	Rate	Payable	Stock of Record
Aetna.....	Com.	\$0.50 q.	Dec. 31	Dec. 14
Aetna.....	Pfd.	1 1/4% q.	Dec. 31	Dec. 14
Akron R. R.....	Com.	\$0.50 s. a.	Jan. 15	Jan. 5
Akron R. R.....	Pfd.	\$2.00 q.	Jan. 2	Dec. 20
American Hard Rubber.....	Pfd.	2% q.	Jan. 2	.....
Baldwin.....	Class A	\$0.37 1/2 q.	Dec. 30	.....
Boston Woven H. & R.....	Com.	\$1.00 ex.	Dec. 15	Dec. 1
Cambridge.....	Pfd.	1 1/4% q.	Jan. 2	Dec. 20
Dayton.....	Com.	\$1.25 s. a.	Jan. 1	Dec. 15
Dayton.....	Pfd.	\$3.50 s. a.	Jan. 1	Dec. 15
Dayton.....	Pr. Pfd.	\$3.50 s. a.	Jan. 1	Dec. 15
Dayton.....	Class A	\$1.75 s. a.	Jan. 1	Dec. 15
Dominion.....	Pfd.	1 1/4% q.	Dec. 31	Dec. 24
Faultless.....	Com.	\$0.50 q.	Jan. 2	Dec. 14
Faultless.....	Pfd.	1 1/4% q.	Jan. 2	Dec. 14
Firestone.....	Pfd.	\$2.00 q.	Jan. 20	Jan. 10
Firestone.....	6% Pfd.	\$1.50 q.	Jan. 15	Jan. 1
Firestone.....	7% Pfd.	\$1.75 q.	Feb. 15	Feb. 1
General.....	Pfd.	1 1/4% q.	Jan. 2	Dec. 20
General.....	6% cum. pfd.	1 1/4% q.	Dec. 31	Dec. 30
Goodyear (Can.).....	Pfd.	1 1/4% q.	Jan. 2	Dec. 15
Goodyear (Can.).....	Com.	\$1.25 q.	Jan. 2	Dec. 15
Plymouth.....	Pfd.	\$0.50 q.	Dec. 15	.....
Seiberling.....	8% Pfd.	\$2.00 q.	Jan. 2	Dec. 20

New Incorporations

ABORN RAINCOAT & NOVELTY Co., INC., Dec. 4 (New York), capital \$10,000. H. L. Wasserman, 8201 Bay Parkway, A. Deutsch, 359 So. Second St., both of Brooklyn, N. Y., and R. Cahn, 1140 Ward Ave., New York, N. Y. Principal office, Manhattan. To manufacture raincoats, etc.

CONSOLIDATION RUBBER Co., INC., Dec. 10 (Delaware), capital stock is 200,000 shares no par value. J. V. Pimm, A. G. Bauer, both of Philadelphia, Pa., and R. L. Spurgeon, Wilmington, Del. To manufacture, buy, sell, and deal in automobile tires and tubes, and rubber goods of all kinds.

W. J. DIAMOND Co., INC., Dec. 1 (New York), capital \$20,000. M. Bross, 3760 Park Ave., J. M. Rothman, 19 East 7th St., both of New York, N. Y., and B. Katz, 558 Montgomery St., Brooklyn, N. Y. Principal office, Manhattan. General metal and rubber business.

GENERAL TIRE & RUBBER Co. OF ARGENTINA, Nov. 12 (Delaware), capital stock \$10,000, par value \$100. A. L. Miller, A. V. Lane, and C. S. Peabbles, all of Wilmington, Del. To manufacture, buy, sell, import, export and otherwise deal in all kinds of tires and tubes.

GRIFFITH TIRE & RUBBER Co., INC., Dec. 4 (New York), capital \$100,000. E. F. Griffith and E. A. Griffith, both of 84 Yale Place, and C. F. Wren, Linden St., all of Rockville Centre, N. Y. Principal office, Rockville Centre, N. Y. To manufacture tires and rubber goods.

SCHRAGIN PUNCTURE PROOF TIRE CORP., Nov. 30 (New York), capital \$200,000. K. Schragin, 987 Trinity Ave., S. J. Mindheim, 400 Lafayette St., and B. Edelharts, 71 West 47th St., all of New York, N. Y. Principal office, Manhattan. To manufacture and deal in puncture proof tires.

XVLCs RUBBER Co. OF CALIFORNIA, Dec. 17 (Delaware), capital \$50,000. A. V. Lane, C. S. Peabbles, and E. B. Stauffer, all of Wilmington, Del. To deal in rubber and its products.

New York Stock Exchange Quotations

Company	December 21, 1928	High	Low	Last
Ajax.....	9 3/4	9	9 1/2
Fisk.....	14 1/4	13 3/4	14 1/8
Fisk, 1st pfd.....	65	65	65
Fisk, 1st pfd, cv.....	62 1/2	62	62
Goodrich (4).....	93 1/4	90	93 3/4
Goodyear.....	112	104 1/2	111 1/2
Goodyear, 1st pfd, (7).....	101 1/4	101 1/2	101 1/8
Intercontinental.....	11 1/4	11 1/8	11 1/2
Kelly-Springfield.....	22 3/4	21 1/4	21 1/2
Lee.....	21 1/4	20 1/4	21 1/4
Miller.....	23 1/4	23	23 1/8
U. S. Rubber, ex rights.....	39 1/2	38 1/2	38 3/4
U. S. Rubber, 1st pfd.....	76 1/2	75 1/8	76 1/2

Akron Rubber Stock Quotations

Company	December 20, 1928	Bid	Asked
Akron R. R.....	27	27
Akron R. R., pfd.....	94	98
Falls.....	30	5
Faultless.....	220	240
Firestone.....	110	110 1/2
Firestone, 6% pfd.....	108	110
Firestone, 7% pfd.....	200	220
General.....	91	99
General, 6% pfd, ex. div. 1 1/2%.....	110 3/4	111 3/4
Goodrich, pfd.....	106	106 3/4
Goodrich, 6 1/2%.....	106 1/2	107 1/2
Goodyear.....	101	102
Goodyear, 7%, 1st pfd.....	99 1/2	100
Goodyear, prior pfd., 5s '28.....	99	99
Goodyear, 1st mtg. 8s, 5 1/2s '31.....	92 1/2	92 1/2
Goodyear, deb. 8s 5s '37.....	35	36
India, com.....	22 1/2	23 1/2
India, 7% pfd.....	70	74
Miller, 8% pfd.....	54	55
Mohawk.....	90	90
Mohawk, 7% pfd.....	40	40
Rubber Service.....	51 1/4	53
Seiberling.....	103 1/2	104 1/2
Star.....	8	8
Star, 8% pfd.....

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

NUMBER	INQUIRY
1185	Manufacturer of puffed rubber.
1186	Automatic machines for dipping toy balloons, nipples, etc.
1187	Trimming machinery.
1188	Art proofing machine used on single texture rubber coated raincoat cloth.
1189	Use of paraffin for increasing wearing surface of tires.
1190	Manufacturer of black rubberized camera cloth.
1191	Manufacturer of dog bones.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

NUMBER	COMMODITY	CITY AND COUNTRY	PURCHASE OR AGENCY
34,629	Tires.....	Swatow, China.....	Both
34,646	Galoshes and rubbers.....	Valparaiso, Chile.....	Agency
34,649	Rubber Goods.....	Santiago, Chile.....	Agency
34,654	Tires.....	Montevideo, Uruguay.....	Agency
34,660	Beltings and packings.....	Prague, Czechoslovakia.....	Agency
34,667	Specialties.....	Bucharest, Rumania.....	Agency
34,723	Advertising specialties.....	Berlin, Germany.....	Purchase
34,724	Blankets for offset printing machines.....	Hamburg, Germany.....	Both
34,725	Overshoes.....	Berlin, Germany.....	Agency
34,726	Sheeting.....	Panama City, Panama.....	Agency
34,727	Rubber goods and coated fabrics.....	Sonneberg, Germany.....	Agency
34,737	Druggists' supplies.....	Baghdad, Iraq.....	Either
34,805	Vulcanizing materials.....	Baghdad, Iraq.....	Purchase
34,819	Tires and tubes.....	Baghdad, Iraq.....	Purchase
34,820	Automobile cloth.....	Zurich, Switzerland.....	Either
34,821	Footwear, sanitary goods and toys.....	Stockholm, Sweden.....	Agency
34,822	Rubber goods.....	Hong Kong, China.....	Agency
34,823	Rubber goods.....	Hong Kong, China.....	Agency
34,824	Bathing caps.....	Copenhagen, Denmark.....	Agency
34,825	Surgeons' gloves.....	Paris, France.....	Agency
34,826	Hot water bottles, hose and mats.....	Christchurch, New Zealand.....	Agency
34,870	Frasers.....	Paris, France.....	Agency
34,887	Bathing slippers, overshoes with rubber case, gloves and steam pipe.....	Paris, France.....	Both
34,944	Bathing caps.....	Prague, Czechoslovakia.....	Agency
35,007	Soles.....	Nice, France.....	Purchase
35,031	Tires.....	Prince Rupert, Canada.....	Agency
35,067	Automobile top material.....	Port Elizabeth, South Africa.....	Agency

THE UNITED STATES RUBBER Co. announces that William Wiseman of Kuhn, Loeb and Co., Henry Rogers Winthrop of Harris, Winthrop and Co. and a vice president of the Wabash railroad, and Henry David of Wilmington, Del., have been elected directors of the United States Rubber Co.

The Rubber Industry in America

Annual Meeting of the Seiberling Rubber Co.

The annual stockholders' meeting of the Seiberling Rubber Co. was held in Akron, O., Dec. 17. Routine business was transacted, including presentation of the annual statement.

The following directors were re-elected: F. A. Seiberling, C. W. Seiberling, W. S. Wolfe, H. L. Post, W. A. M. Vaughan, George T. Bishop, B. O. Etling, M. W. Harrison and A. C. Dent.

The directors organized by reelecting the old officers as follows: F. A. Seiberling, president; C. W. Seiberling, vice president and treasurer; W. S. Wolfe, vice president in charge of production; H. L. Post, vice president in charge of sales; and W. E. Palmer, secretary and assistant treasurer.

Replegle Manager of Grasselli Rubber Service

In our issue of December it was erroneously stated that H. H. Replegle was manager of the rubber service department of the National Aniline & Chemical Co. Mr. Replegle now serves in that capacity with the Grasselli Chemical Co., and has been with the latter organization since 1923. We regret the error and trust this correction will make suitable amends.

Firestone Radio Program

H. S. Firestone, Sr. spoke over a worldwide hookup radio broadcast on Monday evening, Dec. 3, at eight o'clock. This was in connection with the inauguration of a series of Firestone radio programs, which will be broadcast every Monday evening throughout the winter as the "Voice of Firestone." These

Goodyear's Southern Plant

The new southern plant of the Goodyear Tire & Rubber Co., which is expected to cost approximately \$7,500,000, will be located at Gadsden, Ala. The plant will be constructed in four units, the first of which should be completed next summer. A site of 300 acres was purchased by popular subscription by the residents of Gadsden as an inducement for the company to locate in that city. When the four units of the factory are completed, it will be one of the largest industrial concerns in the south, and will employ approximately 8,000 persons. A rubber reclamation plant for general rubber goods manufacture and a fabric mill will be included.

Firestone, Goodyear and Goodrich companies were represented at the International Aviation Exhibition held in Chicago early in December. Akron officials who attended were C. C. Sisler and R. L. Taylor from Firestone; L. O. Guinther and Hugh H. Voll from Goodyear; and Henry Wacker from Goodrich.

Ohio

The Electrical Maintenance Engineers' Association, recently organized in Akron, O., elected H. E. Cook, of The B. F. Goodrich Co., president, and O. J. Cummings, Firestone Tire & Rubber Co., secretary-treasurer. G. W. Messner, American Hard Rubber Co., O. J. Cummings and Nick Nigolian, Goodyear Tire & Rubber Co., and A. P. Regal, Philadelphia Rubber Co., were among those named as members of the executive committee.

Mansfield Tire & Rubber Co., Mansfield, O., is building an addition which will make possible a daily output of 10,000 tires, a 100 per cent increase in the company's production.

Herbert R. Schaeffer has joined The B. F. Goodrich Rubber Co., Akron, O., in a special sales promotion capacity. Mr. Schaeffer was vice president of the J. H. Cross Co., New York, previous to which he had been manager of the William H. Rankin Co., New York.

J. R. Hollingsworth has joined The Textile Rubber Co. to engage in production work at the new plant of the company located at Medina, O. Mr. Hollingsworth was with The B. F. Goodrich Co. for nine years, later going to the American Hard Rubber Co.

The General Tire & Rubber Co., Akron, O., held its annual convention of dealers Dec. 3 and 4. About two hundred dealers attended and represented Ohio, Michigan, Indiana, Kentucky, West Virginia, Pennsylvania and New York. The officers who spoke were William O'Neil, president of the company; A. P. Stiller, advertising manager; W. E. Fouse, vice president and treasurer; S. S. Poor, sales manager; C. J. Jabant, vice president and superintendent and Ben Herr, assistant sales manager.

P. C. Searles, an organizer of the India Tire & Rubber Co., Akron, O., recently announced his resignation as secretary and treasurer of the company but will remain as a member of the board of directors.

The Goodyear Tire & Rubber Co.'s estimated earnings for the last six months of 1928 will be close to \$10,000,000. A dividend on the common stock of \$4 appears probable according to close observers.

The Mohawk Rubber Co. has recently announced an insurance program whereby each employe with three months' continuous service is insured for \$2,000 effective Dec. 1. The plan includes life insurance, total and permanent disability benefits, sickness benefits and non-occupational accident benefits, and is carried in addition to the workmen's compensation.



The Firestone Thirty-five Piece Orchestra

programs will be exceptionally fine, judging by the one already heard. The talent is Miss Vaughn de Leath, contralto, Franklyn Bauer, tenor, a thirty-

ceived on the Pacific Coast at 7.30 p. m., in connection with the official opening of the new Firestone factory located at Los Angeles, Calif.

The Akron Rubber Reclaiming Co. held its annual meeting on Dec. 3, when J. B. Huber was reelected president of the company. Other officers that were elected included William Welch, vice-president and general manager; A. M. Alderfer, vice president, and R. J. Houston, secretary and treasurer. The company closed a ten months' period Oct. 30 showing a net profit of \$100,400 prior to payment of federal income taxes.

The B. F. Goodrich Rubber Co.'s employees gave \$110,148 to the fund of the Akron Community Chest which is to be administered by twenty different charitable and benevolent institutions. More than 17,000 Goodrich factory and office employees shared in contributing the fund.

The Rubber Service Laboratories Co., 611 Peoples' Savings & Trust Bldg., Akron, O., manufactures accelerators, anti-oxidants, softeners, etc., for use in the rubber industry. Technical service, without charge, is rendered to all purchasers of the company's product.

The B. F. Goodrich Co. has recently purchased a tire fabric mill at Thomastown, Ga., in which the larger part of the fabric required for cord tires will be produced.

Alexander M. Sneddon has joined the Aetna Rubber Co. and will be located in Ashtabula, O., taking charge of the Ford rubber parts now being made by the Aetna company. Mr. Sneddon had been connected with the Ford Motor Co. from which he recently resigned.

James D. Tew, president of The B. F. Goodrich Rubber Co., Akron, O., recently stated that his father, a founder of the company, sold his quarter interest in 1874 for \$7,500. Goodrich is now a \$150,000,000 corporation.

Mason Tire & Rubber Co.'s plants located at Kent, and Bedford, O., will be sold at public auction at Ravenna, on Jan. 17, 1929. The plants will be offered in two tracts, one at Kent and the other at Bedford. The former has been appraised at \$520,000, while the value of the latter has been placed at \$80,000.

F. H. Comey is now factory manager for the American Tire & Rubber Co., Akron, O. Mr. Comey has been connected with the rubber industry since 1915, first in the efficiency department of Goodyear and then with the Falls Rubber Co. of which he was vice president and secretary.

Mrs. C. C. Goodrich

Mrs. Mary Anna Goodrich, wife of Charles C. Goodrich, director of The B. F. Goodrich Co., died Dec. 12, at Phoenix, Ariz. Mrs. Goodrich had been in ill health for several years and was taken to Phoenix three weeks ago in the hope that the change of climate would benefit her. Funeral services were held at York Harbor, Me.

Rubber Leader Who Has Risen Rapidly

To have advanced from service clerk to the position of second in command of one of the world's greatest rubber companies within fourteen years, and yet not 40 years old, has been the unique experience of Thornton G. Graham, first vice president, director, and member of the executive committee of The B. F. Goodrich Co. That such rapid promotion has been due



Thornton G. Graham

to sheer merit has been quite evident to all who have had dealings with this uncommonly competent rubber production executive.

Mr. Graham was born Jan. 30, 1889, at Lee, Mass., his father being associated with the management of the Fillebrown department store in his native town. On his father's side his ancestry is Scotch and on his mother's English. After leaving the grammar schools in Lee, he took a preparatory course at Mt. Hermon School, Mt. Hermon, Mass., finishing there in 1909 and next entering Princeton University, from which he graduated in 1914 with the degree of civil engineer. In the same year he got his first practical acquaintance with rubber manufacturing, having entered the service department of the Goodyear Tire & Rubber Co. at Akron.

Three years' experience in the Goodyear works qualified him for an important position in production and development with the Falls Rubber Co., Cuyahoga Falls, O. He next went to the Inland Rubber Co., Chicago, Ill., and remained as its factory manager until April, 1921, when he was induced to become the factory manager of the Mason Tire & Rubber Co., Kent, O. That position he retained until The B. F. Goodrich Co. at Akron prevailed upon him to become its production superintendent of the tire division, Dec. 1, 1925.

The Goodrich management was quick to appreciate his ability and in April, 1926, Mr. Graham was appointed superintendent of the tire division. In June, 1927, he was advanced to the place of assistant works manager, and in October he became the works manager. In January, 1928, he was elected a director of the company and a member of the executive committee, and in March was chosen as first vice president.

Mr. Graham is an ardent lover of out-

door sports, is a member of the Portage Country Club and University Club, both of Akron, and the Twin Lakes Country Club. He is a Mason and a Republican. He was married Oct. 25, 1916, to Miss Jessie Curie, of Akron, O., and they have two sons and a daughter. Their home is at Kent, O.

The United Rubber Machinery Exchange, Newark, N. J., plans to enlarge its Akron warehouse, making it the central headquarters. In the near future one of its members will be appointed manager of the Akron office.

F. H. Harris has rejoined the India Tire & Rubber Co., Akron, O., and will act as manager of accessory and repair material sales.

C. B. McCready has been appointed office manager of the New York branch of the Dayton Rubber Mfg. Co., Dayton, O., with quarters in the Lipton Tea Bldg., Hoboken, N. J.

The Willoughby Rubber Corp., Willoughby, O., has purchased the Hadfield-Penfield plant in Willoughby from the W. A. Riddell Co. of Bucyrus, O.

W. W. Sanders has joined the Boston Woven Hose & Rubber Co., Boston, Mass., as assistant manufacturing superintendent.

Cameron Machine Reports Sales Increase

According to a statement issued today by James A. Cameron, president of the Cameron Machine Co., 61 Poplar St., Brooklyn, N. Y., the company's books show an increase of 28 per cent over 1927 for the year just closing in the sale of its sole product, slitting and roll-winding machines. This represents an increase of one quarter over last year, indicating expansion and growing prosperity in the trade.

The concern's substantial sales increase has been reflected in necessary factory enlargement and improvement which has just been completed to meet the further increase in sales expected for 1929.

Crude Rubber Shipments

Shipments of crude rubber to the United States for 1928 may exceed 450,000 long tons, it is indicated by figures of weekly totals compiled during the past year by the rubber division of the Department of Commerce. This will surpass 1927 shipments by more than 50,000 tons and will exceed those of 1926 by some 60,000 tons.

Fisk Tires Make Record Trip

Two Knight-motored trucks used on the Martin Johnson African expedition were equipped with Fisk transportation tires. The journey was made across the veldt, through the wildest country, at the rate of 35 to 150 miles daily, and in twenty months the only casualty to the tires was one flat, this occurring near the conclusion of the trip.

New Jersey

The production of tires and tubes increased in some of the rubber plants in New Jersey, while orders for all kinds of mechanical goods are steadily increasing. Hose, belting and packing departments have been busy for some time. The production of brake lining continues good. Manufacturers of rubber heels and soles report a substantial increase over the summer and fall months. The production of hard rubber goods shows a gain in some of the plants.

The Crescent Insulated Wire & Cable Co., Trenton, N. J., has awarded a contract for a three-story brick and steel addition, 100 by 125 feet, to the plant on Taylor St., to cost \$60,000. The new plant is required to handle orders for insulated wire from radio and other concerns.

The Combination Rubber Co., Trenton, N. J., is busy with orders for Viking tires and tubes and is operating twenty-four hours a day. Large sized orders are reported from the western and southern states, one calling for six car loads of tires to one firm.

The Murray Rubber Co., Trenton, N. J., announces that business is again picking up after having dropped off in the mechanical and tire departments during the past few weeks.

The Near Para Rubber Co., Trenton, N. J., continues busy in the manufacture of reclaimed rubber.

The Pierce-Roberts Rubber Co., Trenton, N. J., is very busy on rubber molded goods, and is completing an addition to the press room. Business for December was better than the previous month.

The Vulcanized Rubber Co., Morrisville, Pa., is experiencing a very active season and is operating to capacity in all departments. The company specializes in combs and radio supplies and other hard rubber supplies.

Whitehead Bros. Rubber Co., Trenton, N. J., reports business as being very good with prospects of continued prosperity for the coming year.

The Essex Rubber Co., Trenton, N. J., states that business has shown a substantial increase over the summer months with prospects for a good winter season.

The Puritan Rubber Co., Trenton, N. J., announces that business is steadily increasing and that the production of rubber tiling has about doubled during the past few months. The company is gradually installing new equipment and will shortly erect another factory addition.

F. Robert Lee, general sales manager of the Thermoid Rubber Co., arrived home recently from an extensive business trip through Europe. He reports business as increasing along different lines. The Thermoid company ships brake lining and other products to European markets.

The United Rubber Machinery Exchange, Newark, N. J., announces that it has secured the services of H. M. Newman, formerly general superintendent and engineer of the Foreign Traders Corp. and Holcombe Rubber Co., both of New York, N. Y. Mr. Newman will act as consulting engineer and also represent the firm at its Akron branch.

The Puritan Rubber Mfg. Co., Trenton, N. J., has been operating continually on day and night shifts. An addition has just been completed to the plant and equipment, but the company finds the plant still inadequate to its needs and is rushing forward additional equipment in buildings and machinery. The products are Amtico tile, perforated mats, cements for the shoe trade and general mechanical goods.

The Lambertville Rubber Co.'s plant at Lambertville, N. J., was not sold last month as reported. It has now been purchased by the Citron-Byer Co. and the Frank Milner Co., both of Trenton, N. J., for \$61,000. The sale has been confirmed by the Federal Court. The purchase includes all real estate, machinery and equipment and the famous "Snag Proof" trade mark. Merchandise, raw material and other similar assets were bought by a group of bidders.

William F. Tuley, has joined the general research laboratories of the U. S. Rubber Co., Passaic, N. J. Mr. Tuley was formerly in the research department of the Celotex Co., Chicago, Ill.

C. B. Peschman has become connected with the sales force of the Fisk Rubber Co. and is engaged in special work for the home office in the Newark, N. J., territory. Mr. Peschman is popular and well known in the tire trade having been associated with the industry for a number of years.

New England

Assets of Converse to be Sold at Auction

Federal Judge Lowell approved the sale of the assets of the Converse Rubber Shoe Co., Malden, Mass., at a public auction to be held Jan. 9 at ten o'clock. The assets consist of all real and personal property and the good will of the company.

H. C. Hanson to Head New Sales Department

H. C. Hanson, formerly manager of the Fisk Tire Co., Chicopee Falls, Mass., truck and bus department, has been chosen as head of the newly created car dealer sales department, which will supervise and promote tire sales to dealers of cars using Fisk as original equipment. Thomas B. Summers succeeds Mr. Hanson as manager of the truck and bus department.

Harrison J. Behr has joined the sales organization of the Boston Woven Hose & Rubber Co., Boston, Mass., as a special field representative. Mr. Behr was associated for more than twelve years with The B. F. Goodrich Rubber Co., Akron, O., and for the past seven years has been in the organization of the U. S. Rubber Co., operating through the Mechanical Rubber Division at Cleveland, O.

The Fisk Rubber Co., Chicopee Falls, Mass., has recently appointed J. T. Clinton as manager of the personnel department and director of sales school at the Fisk factory. Mr. Clinton is adequately equipped to assume his new duties, having spent many years in the rubber industry.

Slabach Appointed Advertising Manager

A. W. Slabach was appointed head of the advertising department of the Fisk Rubber Co., Chicopee Falls, Mass., succeeding Miss Mabel G. Webber who tendered her resignation.

Mr. Slabach goes to Fisk from the Falcon Motor Corp., Elyria, O., where he served for two years as advertising manager. Previous to his connection with the Falcon he was for five years associated with Dodge Bros. in advertising and sales.

Miss Webber had been with the Fisk company for twenty years, starting in 1908 as clerk in the sales and advertising department. She rose to the post of assistant advertising manager under George L. Sullivan, later succeeding him as advertising manager. It was Miss Webber who first advocated for use as a trade mark for the company the well-known "Time to Re-tire" boy.

The Fisk Rubber Co., Chicopee Falls, Mass., elected Karl Behr a director to succeed Westmore Willcox, Jr., who resigned.

John M. Bierer has been made assistant factory manager of the Boston Woven Hose & Rubber Co., Boston, Mass. He had formerly been technical superintendent with the same company.

Haywood M. Taylor has resigned as chemist with the Fisk Rubber Co. to accept the position as head of the chemistry department, Wilmer Ophthalmological Institute of the medical school of Johns Hopkins University, Baltimore, Md.

Pacific Coast

Goodyear Tire & Rubber Co. of California is still keeping tire production well above 10,000 a day at the Los Angeles plant. Meanwhile new equipment is being installed and manufacturing processes revised to increase output without building additions. The goal of 12,500 a day, warranted by increasing orders, will very likely be reached, it is said, before April next. President Paul W. Litchfield of the parent Goodyear company at Akron spent two days, Dec. 13 and 14, at the Los Angeles plant, having come over from Phoenix, Ariz., where he had been spending a short vacation. R. B. Stringfield, chief chemist, has resigned and H. A. Freeman, chief compounder, has joined the Goodyear Akron staff. Paul Beebe takes Mr. Stringfield's place and J. W. McGrath succeeds Mr. Freeman. C. R. Park, after spending a couple of years in carbon black research work for the Delano Land Co., in Los Angeles, has rejoined the Goodyear research division at Akron.

Ever Ready Rubber Products, formerly C. Benedict Mfg. Co., 12th and Howard Sts., San Francisco, Calif., according to President M. E. Dorman, has just finished the installation of machinery in the large addition to its factory and still finds the plant scarcely able to take care of the heavy orders from all parts of the country for rubberized dresses, aprons, sheetings, shower curtains, and various toilet and sanitary rubber articles of apparel.

American Rubber Mfg. Co., Emeryville, near Oakland, Calif., reports that the last two months showed the largest total of sales of any like period in the company's history. The works have been running night and day for a long time and a heavy volume of fire and oil hose is being turned out, as well as considerable heavy belting. Sales of general mechanical goods continue good and a fair volume of tire repairing materials is being marketed despite a noticeable falling off in sales of such goods due largely to the recent drop in tire prices. General Sales Manager William R. Goudie has been in the Northwest recently and has found prospects very promising. J. Wright Ihlenfeld has replaced Mr. Goudie as southern sales manager with headquarters in Los Angeles.

Samson Tire & Rubber Corp. of Los Angeles, Calif., has recently announced that plans are being made for the erection of an eight million dollar tire factory on a forty-acre tract of land which is located near the Pacific Goodrich plant in Los Angeles, Calif.

It is conceded that Samson has outgrown its plant at Compton, near Los Angeles, and expansion there is not very feasible as it is closely surrounded with valuable improved property, and a new, improved plant on a site permitting of ample building expansion has

been considered and many inducements have been offered to the company to locate elsewhere. Further details are expected in the near future on the matter. Meanwhile the best possible use is being made of the present factory equipment, the plant is being still operated day and night to fill the mounting list of orders, and much relief is being afforded by Plant No. 2 at San Diego, which has been stepping up production very much of late. Sales Manager W. W. Drum has just re-

C. K. Williams & Co.

Open Coast Plant

C. K. Williams & Co., who from its plant in Easton, Pa., has been supplying the rubber and other industries with fine dry colors and fillers marketed under Anchor brand for half a century, recently opened the new Pacific Coast plant at Emeryville, adjoining Oakland, Calif. The new works, costing half a million dollars, has equipment of the most modern design and is capable of handling the largest sized orders. A special feature is the up-to-date laboratory with a staff of well-trained chemists to work out all kinds of special formulas. The plant is operated by C. K. Williams & Co. of California. The entire output will be handled by Marshall Dill, of San Francisco, Pacific Coast selling agent for Williams products for thirty years.

A feature of the formal opening was a luncheon arranged by the Hotel Oakland and tendered to members of the Golden Gate Paint, Oil and Varnish Club of San Francisco, the Oakland Paint, Oil and Varnish Club, and many other guests representing rubber and other industries in the bay cities. The tables represented empty barrels and the seats empty kegs, and so well was the cleanliness and efficiency of modern mechanical equipment exemplified that the diners sat within a few feet of the machinery in full operation without being disturbed in the least by any dust or odors. Mr. Dill, as toastmaster briefly sketched the history of the Williams concern and told how thoroughly it had planned to serve the needs of pigment buyers in the Far West and to provide the speediest service. Verne Frazee and Charles Ayres, both of the Williams organization, acted as hosts. The guests were next taken through the big factory and shown not only how dry earth pigments are made but also the latest process for making ferrite colors and the newest of drying systems. While the Williams concern has many plants, including mines, in this country and Europe, it was explained that the new Coast factory was the "last word."

turned from an extensive trip through the Southern and Atlantic seaboard states and reports a steadily quickening demand for Samson tires. A new district manager has been appointed in Atlanta, Ga., Jack Lambert, who succeeds C. E. Goddard. Philip Ritter, former chief chemist of the Federal Tire & Rubber Co., has been appointed to the development department, and H. A. Clark, who has had Dunlop, Seiberling, and Goodyear experience, is now looking after the engineering department at the Compton plant.

C. T. C. Tire Co., which has taken over the plant of the Columbia Tire Corp., Portland, Ore., is now doing very well according to President and General Manager J. F. Cullen. Not only is distribution being well extended on the Pacific Coast, but the company has negotiated a contract with Laurie & Johns of Sydney, Australia, for the marketing of at least \$60,000 worth of tires monthly in Australia, New Zealand, India, and the Straits Settlements. The deal was closed after Stuart C. Johns had visited the works in Portland last month.

American Rubber Producers, Inc., which has 3,000 acres of guayule under advanced cultivation at Salinas, Calif., and smaller planted tracts at Santa Maria and Irvine in the same state, also has some experimental plantings on a tract near Litchfield, Ariz., and in the neighborhood of the Goodyear cotton plantations. Vice President, Frederic W. Taylor, General Manager J. Miller Williams, and Dr. William B. McCallum, botanist of the guayule station at Salinas, recently inspected the Arizona plantings, which are two years old, and found them making good progress under conditions quite dissimilar from those at Salinas. At the latter place the plants have the aid of winter rains and cloudy weather but in Arizona they have to be aided with some irrigation owing to the scarcity of rain and the long hot summers. The prospects are believed to be good for the development of a high rubber content at the end of the four-year growing period. Mr. Taylor recently resigned as assistant director of the California Botanic Garden in order to give his entire attention to guayule cultivation.

E. M. Smith Co., 637-639 Clarence St., Los Angeles, Calif., has, after much experimenting, decided to discontinue the manufacture of rubber flooring and tiling, according to Secretary-Treasurer Walter G. Smith. The line may be taken up later but for a while the works will concentrate on heavy conveyer belting, light and heavy hose, brake blocks and lining, oil field rubber supplies, and general mechanicals, the demand for which now taxes the capacity of the steadily expanding plant.

Western "Dri-Kure" Vulcanizer Mfg. Co., 908-912 W. Pico St., Los Angeles, Calif., has taken over the distribution and marketing of the products of the W. B. Herbst Co., 3260 W. 10th St., Los Angeles, Calif.

Firestone's Formal Opening

FOR five days, December 4 to 8, inclusive, 25,000 visitors inspected the new \$7,000,000 Los Angeles plant of the Firestone Tire & Rubber Co. of California, which is said to be the most modern tire factory in the world. Conspicuous among those greeting the visitors was Russell A. Firestone, second son of Harvey S. Firestone, and who, as vice president and executive head of the new western corporation, had just arrived from Akron in company with Executive Vice President J. W. Thomas of the parent Firestone company.

The formal opening of the great factory was announced on the night of December 3 by President Harvey S. Firestone over a nation-wide radio hook-up with short-wave transmittal linking also overseas stations. The exercises at the plant began on the following day with a formal dedicatory luncheon in the gaily-bedecked second floor storeroom, tendered by the commercial bodies of Los Angeles and nearby cities. Souvenirs in the form of little Firestone balloon tires inclosing glass ash receivers were distributed to over 1,000 invited guests. Vice President Shannon Crandall of the Los Angeles Chamber of Commerce was toast master. President George L. Eastman being too ill to attend. However, he sent a telegram welcoming the Firestone industry and its personnel.

Mr. Firestone, who was given a rousing welcome, made a brief speech in which he said that the opening of the new plant was the realization of one of the fondest dreams of the Firestone organization.

He thanked the community for the cordial reception given the company, and said that with such an auspicious beginning, with the able and loyal support of the entire factory force, and the hearty encouragement given by the great commercial interests of the Southwest, coupled with the wonderful progress being made throughout the whole Pacific Coast territory, he felt sure that the new Firestone enterprise would prove to be one of the great industrial successes of that section. Already, he said, the parent plant had shown its confidence by authorizing the Los Angeles factory to increase its daily output from 5,000 tires to 7,500 with 9,000 tubes for over 3,000 dealers in the Far West and buyers overseas.

Mr. Thomas, who had been credited by Mr. Firestone as second only to the elder Mr. Firestone in extending the company's widespread operations, said that he was

particularly well impressed with the generous welcome given the new industry and those who sponsored it. It was gratifying and stimulating, he said, to work in a community showing such a spirit. He warned Akron to look out for its laurels as a rubber center, and evoked much applause by remarking that while Ohio had long been the mother of presidents, California is now giving the country a Chief Executive and Los Angeles a Firestone factory.

Captain Robert Dollar, veteran shipping man of San Francisco, and head of the Dollar Steamship Line, said that coincident with the great growth of the Pacific Coast the center of world commerce is plainly shifting from the Atlantic to the Pacific Ocean, and the Firestone company has wisely anticipated this trend. It shows great enterprise, he said, in bringing rubber 8,000 miles to be made into products with the highest paid labor and shipping them back to be sold in competition with the cheapest labor in the world. Overseas trade to the West is bound to be huge in the early future, and China alone when stabilized will provide one of the greatest of markets.

Greetings were also extended by President William G. Bonelli of the Los Angeles City Council and R. F. McClellan of the Los Angeles County Board of Supervisors. Mr. Thomas introduced and figuratively gave the keys of the establishment to R. J. Cope, factory general manager; R. C. Tucker, general sales manager; C. A. Myers, supervisor of plant construction and engineering; H. A.



XYLOS RECLAIMING WORKS

MAIN TIRE BUILDING

ADMINISTRATION OFFICE

The Firestone Los Angeles Plant

Above—Russell A. Firestone and J. W. Thomas Inspect the Vulcanizing Department

McKeller, manager of Los Angeles sales; Tress E. Pittinger, factory manager; Paul Rubens, assistant treasurer; and Dr. F. W. Stavely, laboratory and development head.

Nearly 1,000 members of various service clubs, including the Advertising, Rotary, Kiwanis, and Cooperative clubs, were luncheon guests on the second day of the celebration, with Herman A. Nater of the Advertising Club presiding. The chief addresses were made by Messrs. Firestone and Thomas. On the third day a luncheon attended by 750 was given in honor of the Society of Automotive Engineers and the Purchasing Agents' Association. Sales Manager Tucker was toastmaster. Messrs. Firestone and Thomas were again the principal speakers, and talks were also given by Branch Manager McKeller, President P. T. Keenan of the local Purchasing Agents' Association, and Watt L. Moreland, president of the Moreland Motor Truck Co., the latter strongly urging close cooperation between car builders and tire makers for better transportation.

A general sales conference of branch managers and representatives from the eleven states served by the new Firestone factory marked the third day of the celebration, and after a careful study of the plant the distributing force enjoyed a banquet at the Mayfair Hotel, fully 200 being present. Later they attended the Orpheum Theatre.

The plant continued open for public inspection for the following two days. It is estimated that fully 25,000 had been guided through the rubber works during the five days.

Pacific Goodrich Rubber Co. is rapidly stepping up production at its big new plant in Los Angeles, Calif., and new machinery is being installed to take care of the pressure of orders for tires and tubes and to carry out the expansion program. Early in December the works began to turn out 4,000 tires daily, and it is believed that within a few weeks the output can be raised to 5,000. George Livermore, special representative of the parent Goodrich company in Akron, has been conferring with the executives of the Los Angeles plant with a view to solving some of the problems of the engineering department. The management reports that an earlier anxiety about labor conditions is now quite dispelled, the turn-over percentage having in the past couple of months dropped fully one-half. The Los Angeles Purchasing Agents Association was recently entertained at the works.

Golden State Rubber Mills, 1920 E. Vernon Ave., Los Angeles, Calif., is rapidly increasing its output of rubber supplies for oil fields, and is producing a large quantity of patented rubber articles of various kinds, meanwhile adding much to its equipment. Recent additions to its force, according to President Emmet S. Long, have been R. B. Stringfield, long chief chemist at Goodyear's, and Frank Bunker, designer of oil tool equipment, and who will specialize on engineering matters.

General Superintendent of California Goodyear

In the appointment of Edwin Joel Thomas as general superintendent of the Goodyear Tire & Rubber Co. of California, the parent company at Akron once more proves that unusual merit and capability on the part of the younger members of



E. J. Thomas

its force do not go unrewarded. While many notable promotions have been made in this direction in the past few years, that of Mr. Thomas is especially striking in view of the fact that although he has not yet reached thirty, he has been intrusted with an exceptionally responsible position. While he modestly disclaims any special qualifications, the fact that he has already held several important posts with Goodyear, the only concern that he has ever been identified with, and that he has been closely affiliated with President Litchfield for eleven years tells its own story.

Mr. Thomas was born Apr. 27, 1899, in Akron, O., and, after graduating from the Central High School there in June, 1916, he took a special course in the University of Akron. He had scarcely left school in 1916 when he entered the development department of the Goodyear works. In a short time he was made secretary to Mr. Litchfield, then factory manager. Next he was appointed personnel manager, and soon afterward became assistant to President Litchfield.

Clubs and societies have not attracted Mr. Thomas, but, although he belongs to no organizations, he has always been enthusiastic about sports in general, and for years was a leader in contests at the Goodyear gymnasium in Akron, which he hopes may before long be duplicated in Los Angeles. He lives at 2632 Raymond Ave., Los Angeles, Calif.

Carbon Products Co., 2357 E. Slauson Ave., Los Angeles, of which Ralph R. Langley is president, manufactures lampblack for the ink, paint, and allied trades, and has been doing considerable research work on a fine oil black, which, it is said, will be available for a wide range of rubber compounds in which fine carbon black is much used. The company expects to start on large scale production in the near future.

Dunlop Tire & Rubber Co. reports sales showing a substantial increase for the year throughout the whole Pacific Coast field, in the Northwest the gain being fully 100 per cent over 1927. Sales Manager Arch Harp, of Buffalo, will visit the Coast in January.

Barthold De Mattia, vice president of the National Rubber Machinery Co., of which the De Mattia Brothers' tire and tube building and vulcanizing machinery plant at Clifton, N. J., is a unit, arrived in Los Angeles from New York on the S. S. California, via the Panama Canal, Dec. 1, and spent nearly three weeks in visiting leading cities on the Pacific Coast and getting considerable information at first hand regarding rubber trade conditions in that region. His company has been repeatedly urged to establish a branch factory here, but is not likely to make a decision in that regard until various factors have been carefully considered. During his stay on the Coast Mr. De Mattia was the guest of many leading rubber and other manufacturers.

Kelly-Springfield Tire Co. reports sales in the Pacific Coast territory as much above the average for the mid-winter season, and with good prospects for a lively spring trade. George Martin, special representative from the main office in New York, has just completed his yearly calls on the Coast branches. A recent appointment to the staff has been that of E. T. von Bülow, grandson of the famous German diplomat, Prince Bernhard von Bülow. He will have charge of distribution in San Diego and Imperial counties, California.

Pacific R. & H. Chemical Corp., El Monte, Calif., is increasing its output of standard reclaim, according to Works Manager F. S. Pratt, and has just completed the installing of new mills, driers, and other equipment for increasing production.

Midwest

The Grasselli Chemical Co. recently purchased twenty acres in Ecorse, Mich., where, it is said, a \$5,000,000 plant will be built.

Edward Gudeman, Chicago, Ill., has left for a two months' stay in India and Japan. While in the former country he will study conditions of the oil and rubber industries, and while in Japan will investigate certain chemical problems.

The Western Rubber Products Corp., Kansas City, Kan., has recently completed its corporation and, with the installation of new machinery, expects to be in full operation by Jan. 15. J. M. Miller is president; W. H. Brown and George M. Gaugh, vice presidents; and Charles Ora, factory manager. The directors include the above and F. M. Campbell, Frank Barger and Dr. K. K. Birock. The company manufactures Oralastic flooring, paving, roofing, tiling and expansion joints.

Canada

Rubber manufacturers announce a reduction in some lines of mechanical rubber goods, no particular reason being given. One grade of water hose has been reduced from 50 per cent to 57 per cent off list. In steam hose the grade formerly taking 40 per cent is now quoted at 46 per cent off list. The garded by some distributors as only a off list is now 55 per cent.

A report from Vancouver, B. C., states that a general reduction in the British Columbia prices has been made on nearly all standard tires ranging from 2½ to 7 per cent on casings, 5 to 10 per cent on tubes, and 2½ per cent on solid tires. This brings tire prices in Vancouver to the lowest point in the history of the trade. This cut is regarded by some distributors as only a slight reduction, and it is pointed out that a reduction of 5 per cent on a 32 by 4 casing would mean a difference of only 80 cents.

The absence of real cold weather and snow up to the time of writing has retarded the sale of rubbers and overshoes. Travelers have covered their territories with tennis lines for spring and are now working on orders for tires. No change is reported in the price of low rubbers but there is a feeling they may be cheaper after Jan. 1. A big sale is anticipated for women's fancy low cut overshoes and the popular colors are beige and brown, but now that tobacco brown is the leading color in women's frocks it may eclipse the beige. There still exists a fair demand for greys.

From centers we again hear the old cry of price cutting on rubbers by retailers. This competition is made keen because practically all makes of low rubbers look alike, and the dealer finds it hard to claim anything especial in the line he is handling to the one his competitor features. It seems a pity that the price cutters cannot agree to secure a better profit on rubbers, for

the sacrifice they make means very little to rubber wearers and if saved would mean something worth while to the retail trade.

C. H. Carlisle, president of the Goodyear Tire & Rubber Co. of Canada, Ltd., and president of the Goodyear Cotton Co. of Canada, Ltd., St. Hyacinthe, Que., was recently elected a director of the Dominion Bank, Toronto, to fill a vacancy on the board.

National Motor Show of Eastern Canada staged in Montreal each year as the Montreal Motor Show will be held from Jan. 19 to 26 inclusive, in the new Stadium Bldg. recently completed. The space is all sold and there is a waiting list.

Firestone Tire & Rubber Co.'s recent broadcast "Canadian Night" was complimented by radio fans and listeners throughout the Dominion for the splendid concert given.

Jack Hancock, Toronto, Ont., has been appointed eastern Canadian agent for the lines manufactured by the Leyland & Birmingham Rubber Co., Ltd., Glasgow, Scotland.

Jenckes Canadian Co., Ltd., Drummondville, Ont., has been acquired by interests associated with Dominion Textile Co., Ltd. The Jenckes plant is equipped with 37,028 ring spindles and 88 looms for the manufacture of auto tire yarns and fabrics.

Alex Johnston, managing director of the North British Rubber Co., Ltd., Edinburgh, Scotland, recently spent a few days in Montreal and Toronto and returned home via New York.

N. E. Davidson, Toronto, has been appointed manager of the North British Rubber Co.'s Canadian branch in Toronto. He succeeds the late E. L. Kingsley.

Central Technical School, Toronto, recently held its annual commencement and scholarships given by members of the Toronto branch were presented to the winners. Included among the list of

Tires Cut in Canada

A general reduction of tire prices was effective recently in Vancouver, B. C. George Mutch, of Mutch's Tire Co., Vancouver, one of the largest metal dealers stated that these prices were practically uniform for all the various makes sold and that the trade was largely confined to tires manufactured in Eastern Canada. Prices of the Gregory Tire & Rubber, Ltd., Port Coquitlam, Vancouver, are also uniform with those of eastern Canadian makes but its trade is negligible in comparison, the output being exported largely to New Zealand and Australia.

scholarship donors were those of the Goodyear Tire & Rubber Co. of Canada, Ltd., and the Dunlop Tire & Rubber Goods Co., Ltd., the former of New Toronto and the latter of Toronto, Ont.

Northern Rubber Co., Ltd., is carrying out extensions to its plant at Guelph, Ont. The added two stories and basement are to be used for offices and warehouse purposes, and will increase the factory capacity 1,000 to 1,500 pairs a day.

Goodyear Tire & Rubber Co. of Canada, Ltd. In a recent week the Goodyear export department at New Toronto, Ont., shipped 45 carloads of tires, tubes and accessories in six days, 35 of which were transferred to one steamer for the South American ports of Santos, Montevideo and Buenos Aires. More than 30,000 tires were in this shipment and the total value was close on to a third of a million dollars.

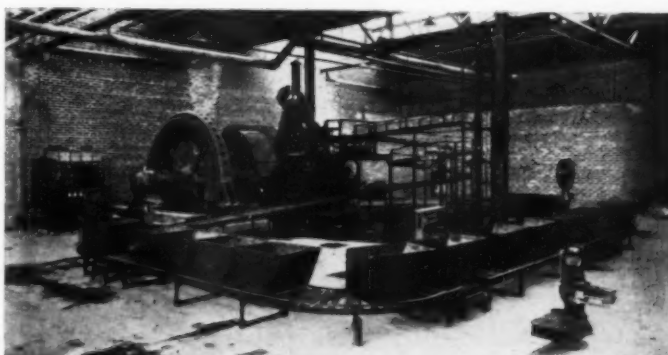
The Northern Rubber Co., Ltd., Guelph, Ont., has opened a branch warehouse at 336 Charlotte St., Sydney, N. S., with F. G. McCarthy in charge.

Sherbrooke Cotton Co., Ltd. A new company is being formed to operate the Canadian Connecticut Cotton Co. plant by F. G. Daniels, managing director, and J. H. Webb, secretary of Dominion Textile Co., Ltd., which recently bought the property and assets of Canadian Connecticut Cotton Mills, Ltd., maker of tire fabrics.

Anderson-Prichard Structures

A system of structures, which has met the approval of federal and state engineers, has been perfected by the Anderson-Prichard Oil Corp., Oklahoma City, Okla., in the waters of the Canadian River. The company has two locations within 600 feet of the river bank, with two more locations farther out in the river. A bridge ties together three locations, being approximately 1,400 feet long and extending half-way across the river.

C. E. George, for many years Western manager of the American Schaeffer & Budenberg Corp., has recently joined the sales staff of the Taylor Instrument Companies, Rochester, N. Y. He will be associated with the Chicago office of the company with headquarters at 58 E. Washington St., Chicago, Ill.



One of the Giant Banbury Mixers in the Los Angeles Plant of the Pacific Goodrich Rubber Co.

Census of Manufactures, 1927

Rubber Boots and Shoes

THE Department of Commerce announces that, according to data collected at the biennial census of manufactures taken in 1928, the establishments engaged primarily in the manufacture of rubber boots and shoes in 1927 reported a total output valued at \$124,607,801, of which amount \$115,785,941 was contributed by rubber boots and shoes and \$8,821,860 by miscellaneous products. The value of products for 1927 represents an increase of 7.5 per cent as compared with \$115,934,554 for 1925, the last preceding census year. The total production of boots and shoes, including those manufactured as secondary products by establishments classified in other rubber industries, was valued at \$132,468,774 for 1927, an increase of 10.5 per cent as compared with \$119,922,826 for 1925.

Of the 22 establishments reporting for 1927, 10 were located in Massachusetts, 4 in Connecticut, 3 in Rhode Island, and 1 each in Illinois, Indiana, New Jersey, Pennsylvania and Wisconsin. In 1925 the industry was represented by 23 establishments, the decrease to 22 in 1927 being due to the fact that one establishment was reported as idle during the entire year.

The statistics for 1927 and 1925 are summarized in the following tables. The 1927 figures are preliminary and subject to such correction as may be found necessary after further examination of the returns.

TABLE 1. SUMMARY 1927-1925

	1927	1925	Per Cent of Increase or Decrease (—)
Number of establishments.....	22	23	(1)
Wage earners (average number) ² ..	26,848	24,999	7.4
Wages ³	\$32,078,955	\$28,057,948	14.3
Cost of materials, factory supplies, containers for products, fuel, and purchased power ⁴	\$43,372,916	\$40,566,085	6.9
Materials, supplies, and containers.....	\$41,815,119	(*)	...
Fuel and power.....	\$1,557,797	(*)	...
Products, total value ⁵	\$124,607,801	\$115,934,554	7.5
Boots and shoes (see detail, Table 2).....	\$115,785,941	\$105,398,341	9.9
Other products, value.....	\$8,821,860	\$10,536,213	-16.3
Value added by manufacture ⁶	\$81,234,885	\$75,368,469	7.8
Horsepower.....	67,159	59,413	13.0

¹Per cent not computed where base is less than 100.

²Not including salaried employees.

³The amount of manufacturers' profits can not be calculated from the census figures for the reason that no data are collected in regard to a number of items of expense, such as interest on investment, rent, depreciation, taxes, insurance, and advertising.

⁴Not reported separately.

⁵Value of products less cost of materials, factory supplies, containers for sale with products, fuel, and purchased power.

TABLE 2. PRODUCTION 1927-1925

Kind	1927	1925	Per Cent of Increase
Rubber boots and shoes made in all rubber industries, total value...	\$132,468,774	\$119,922,826	10.5
Made in the rubber boot and shoe industry, value.....	\$115,785,941	\$105,398,341	9.9
Secondary products of other rubber industries, value....	\$16,682,833	\$14,524,485	14.9
Rubber boots			
Pairs.....	5,361,667	4,739,423	13.1
Value.....	\$16,746,281	\$16,027,904	4.5
Rubber shoes and overshoes			
Pairs.....	71,529,770	52,338,782	36.7
Value.....	\$90,953,333	\$80,076,608	13.6
Lumbermen's			
Pairs.....	3,772,632	(1)	...
Value.....	\$8,851,138	(1)	...
Arctics			
Pairs.....	7,801,416	(1)	...
Value.....	\$16,880,084	(1)	...
Gaiters			
Pairs.....	24,878,386	(1)	...
Value.....	\$30,081,972	(1)	...
Arctics and gaiters, not reported separately			
Pairs.....	4,009,576	(1)	...
Value.....	\$7,422,995	(1)	...
Other rubber shoes, rubbers, and footholds			
Pairs.....	31,067,760	(1)	...
Value.....	\$27,717,144	(1)	...
Canvas rubber-soled shoes			
Pairs.....	27,790,937	24,999,932	11.2
Value.....	\$24,769,160	\$23,818,314	4.0

(1)Not called for on schedule.

Doubts Need of Proteins in Curing¹

SOME curious results of vulcanizing serum-free pure rubber are noted by two German investigators, Rudolph Pummerer and Hans Pahl, and incidentally the question is raised anew of the necessity of proteins in the curing process. They had obtained their highly-purified product, "total rubber," from ammonia-preserved latex by hydrolyzing the protein content with alkali, treating the resulting cream with alkali, washing and dialyzing it to remove alkali residue, coagulating it with acetic acid, and then extracting resinous traces with acetone. Results obtained are held to strengthen the theory of the two-phase nature of the rubber particle, that is, that the latex droplets consist of a viscid interior and an outer firm and elastic membrane, which when pierced or broken as in milling allows the fluid to run out.

When the ether-soluble (or sol rubber) portion of the minced nitrogen-free "total rubber" had been extracted there remained a gelatinous residue hard to dissolve and varying from 20 to 45 per cent (a probable average being 35), termed "gel-rubber," although it analyzed as true rubber with the empirical formula of $(C_5H_8)_x$. It is believed that it is the combination of such sol and gel that gives rubber its unique characteristics. The gel can be transformed into sol rubber, cumene being preferred "as it is the best of all rubber solvents, rendering the gel more soluble in ether."

The purified rubber can be vulcanized as a soft or a hard rubber, and the latter is found to have three times the insulating capacity of hard rubber prepared from ordinary plantation crepe. That the importance of the protein contents of the serum of commercial rubber in accelerating cure or improving quality may be much less than is generally supposed is indicated, the investigators remark, by the fact that when pure rubber had been vulcanized with 10 per cent sulphur at 51½ pounds steam pressure the product showed physical properties equal to those of plantation rubber, and behaved like the latter in rate of curing. With 7½ per cent of sulphur the pure rubber needed more time for curing. Oddly, efforts to vulcanize either the sol or the gel components apart proved disappointing, neither reacting much with sulphur, and obviously working better when not divorced.

¹Abstracted from translation published in *Rubber Chemistry & Technology*, London, April, 1928. Original article appeared in *Berichte der Deutschen Chemischen Gesellschaft*, vol. 60, pp. 2153-63 (1927).

Toy Balloons and Filtration¹

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RUBBER dams as aids in pressure filtration in the laboratory have been recommended by Gortner, Clarke, and perhaps others. This prevents the caking and cracking of the precipitate as the solvent is withdrawn. A modification of this plan which is somewhat simpler is to employ an inflated toy rubber balloon in place of the sheet rubber. The balloon has certain definite advantages over the rubber dam. In the first place, it sits on the Buchner funnel securely and needs no mechanical device to hold it in place. Furthermore, there are no "wrinkles" to be smoothed out, since the supple spherical contour of the balloon conforms perfectly to the edges of the funnel. For the usual laboratory Buchner funnels, an ordinary toy balloon is of convenient size when properly inflated. It is placed on top of the funnel after most of the solvent has been removed, but while the precipitate is still in pasty condition.

¹*Ind. & Eng. Chem.*, Nov. 1928, p. 1130.

Radiator Compound Aids Rubber

It is claimed by makers of an antifreeze glycerine radiator compound that the glycerine content, instead of weakening rubber hose, as some have feared, actually toughens it. Bursting tests, it is said, show that radiator hose is actually stronger after being steeped in the glycerine solution over 30 days at 135 degrees F. and that it is also more pliable than before. Glycerine was early used in compounding for its oil-resisting property, in cleaning and polishing finished goods, for rubber stamp making, for softening the better white compounds, increasing resilience and preventing mildew on fabrics. It is said to be unaffected by oxygen and to have no solvent action on rubber.

The Rubber Industry in Europe

Great Britain

Rubber Exhibition

An All Rubber Exhibition was held in London from Dec. 4 to 8. It was an inclusive display of everything made of rubber, from rubber bottles to rubber roads and tennis courts. Mannequins demonstrated the attractiveness of the newest raincoats and colored rubber Wellingtons. The Rubber Growers' Association exhibited some 2,000 rubber bottles, 1,000 rubber toys, rubber beds and rubber sheeting, which were presented as Christmas gifts to the London hospitals. There was a Children's Corner exhibit where rubber toys exclusively of British origin were placed on view. No management charges were made and all profits derived from the exhibition will be devoted to further purchase of rubber goods for the hospitals.

Rubber Production

The *India Rubber Journal* has collected data from a number of British companies in the various rubber centers in the East showing production of crude rubber during the sixth restriction year as compared with that of the year before.

For the entire twelve months of the sixth and last restriction year the 251 companies in Malaya reported crops amounting to 72,783 tons against 72,142 tons in the previous restriction year. The indications are that this output corresponded to about 85 per cent of the standard production of the companies. The production of the companies of Java and Sumatra, on the other hand, show a slight increase, from 40,978 to 41,625 tons. The Ceylon companies had a decreased output, 8,535 tons against 8,804 tons and this is roughly 75 per cent of the combined figure for standard production.

As the exportable quota during the year was 60 per cent the production of the Malay and Ceylon companies was 25 and 15 per cent in excess of the quota respectively, that is to say the equivalent of three months' full normal production as far as Malaya is concerned. This is not held to indicate surplus stocks to that amount since there was a carry forward of exporting rights at the beginning of the year, of which it is supposed many companies availed themselves.

The India and Burma group was able to harvest 5,017 tons against 4,661 tons the year before, while the Sarawak and Borneo group maintained the previous year's level, that is 3,637 against 3,625 tons. In all, the companies reporting to the *India Rubber Journal* had a total output of 131,597 tons in the sixth restriction year as compared with 131,210 tons the year before, so that in the end the slight differences of increase or decrease have

been practically evened up and for all practical purposes the figures remain the same for both years.

The figures for the last month of the sixth restriction year, October, 1928, deserve special mention. As compared with October, 1927 we find the following differences: 251 companies in Malaya show a total increase of 53.69 per cent; 71 companies in Java and Sumatra show a total increase of 26.23 per cent; 46 companies in Ceylon, a decrease of 2.31 per cent; 10 companies in India and Burma, a decrease of 2.51 per cent and 18 companies in Borneo and Sarawak a decrease of 3.70 per cent. In September of 1928 the Malayan shipments showed an increase of $41\frac{1}{3}$ per cent over the shipments of September, 1927. The decrease in Ceylon is noteworthy as it follows a heavy increase in September amounting to 37.65 per cent as compared with the same month of the preceding year.

Firestone Tire Plant

As was announced in these columns last month, the new Firestone tire plant was opened in London with impressive ceremonies, many notables, including the Home Secretary, being present. The new factory adds an important link to the already extensive chain of Firestone tire plants in Akron, Hamilton, Ont., and Los Angeles, Calif., to say nothing of the footwear factory near Boston and two large cotton mills.

The English plant has a floor space area of almost six acres. The mechanical equipment and operating facilities have all the advantages of the experience drawn from the other Firestone factories. Right from the start several hundred people will be employed, the capacity of the plant being 2,000 casings and tubes per day.

The new factory will supply the British Isles as well as the adjacent European countries and some part of the British Dominion.

Institution of Rubber Industry

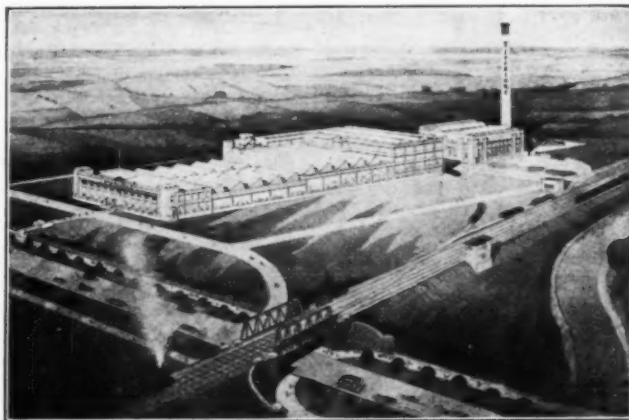
Announcement has been received of a conference on rubber roadways and floor coverings to be held at the seventh annual meeting of the Institution of the Rubber Industry under the auspices of the Institution and the Rubber Growers' Association. This conference takes place on Jan. 3, 1929, in the First Avenue Hotel, High Holborn, London, when Lieut.-Col. T. H. Chapman, consulting engineer of Rubber Roadways, Ltd., will deliver a lecture entitled "Rubber Roadways" and Dr. S. S. Pickles, in cooperation with the Research Association of British Rubber Manufacturers, will speak on rubber floor coverings. The lectures will be illustrated by an exhibition of rubber road blocks and floor coverings. Sir Stanley Bois will preside.

After the annual meeting and presentation of diploma certificates by the Right Hon. Lord Colwyn, P. C., president of the Institution, there will be a dinner in his honor.

London Section

At the fifth annual meeting of the London and district section of the Institution of the Rubber Industry, which was held on Nov. 5, D. A. S. Porteous, occupying the chair, stated that membership of the Institution, not including the shareholder members, is now 1,104, an increase of 140 over last year. This shows very satisfactory progress.

The report of the tellers on the postal ballot for the election of the new committee of sixteen members was as follows: C. Baster, Commercial India Rubber Mfg. & Supply Co., Ltd.; C. H. Birkitt, James Lyne Hancock, Ltd.; J. H. Blake, C. E. Hainke & Co., Ltd.;



Firestone Tire & Rubber Co. (Great Britain) Ltd., Brentford, England

F. H. Bunce, Macinlop, Ltd.; W. S. Davey, Ceylon Rubber Research Scheme; T. R. Dawson, The Research Association of British Rubber Manufacturers; A. L. Fairbank, Hy. Gardner & Co., Ltd.; F. G. Flounders, Liverpool Rubber Co., Ltd.; E. P. Kay, India Rubber, Gutta-Percha & Telegraph Works Co., Ltd.; J. H. Nicholls, Siemens Bros. & Co., Ltd.; H. W. Orme, James Lyne Hancock, Ltd.; W. J. Perry, India Rubber, Gutta-Percha & Telegraph Works Co., Ltd.; H. Standring, Rubber; E. R. Taylor, Tuck & Co., Ltd.; W. W. Watkins, W. T. Henley's Telegraph Works Co., Ltd.; G. E. Watson, Northern Rubber Co., Ltd.

Dunlop Acquires Trust Holdings

The Tyre Investment Trust has issued a circular stating that it has entered into a provisional agreement with the Dunlop Rubber Co. for the sale of its investments in the Dunlop Rubber Co. (Far East), The Dunlop Rubber Co. (China), the Dunlop Rubber Co. (Straits Settlements) and the Dunlop Tire & Rubber Goods Co. of Canada, together with the loans and advances made by these companies and other assets of the trust. The consideration is: £195,000 payable in cash; the allotment of 850,000 ordinary shares of 6 shillings 8 pence each, credited as fully paid, in the Dunlop company, the right to receive in June either a further 359,000 of such shares or their value in cash at the market price on May 31, 1929, with a minimum price of 26 shillings per share; and a sum equivalent to one-half of any dividend to which the shares would have been entitled in respect of the year 1928 if they had been issued on Jan. 1, 1928. One of the terms of agreement is that for a period of five years the shares to be acquired shall not be sold without the consent of the Dunlop company except to discharge any present or future liabilities of the trust.

Wilkinson Process

The Wilkinson Process Rubber Co., Ltd., of Batu Caves, Selangor, Federated Malay States, exploits one of the newest processes of rubber manufacture in which latex direct is used. The concern turns out a variety of goods chief among which are liners for crushing mills employed in the mining industries. These liners have a good reputation in the Federated Malay States, and not long ago the company announced important orders from one of the gold mines in South Africa.

Now it is learned that James Lyne Hancock, Ltd., London, has taken up the agency for Great Britain and Ireland of the Wilkinson Process Rubber Co., Ltd.

New Goodrich Branch

The British Goodrich Rubber Co. Ltd., has opened a new Scottish branch and service depot in Glasgow at 136 Renfield St. and 98 Duke St., respectively.

Germany

Rubber Statistics

During the first nine months of 1928 Germany imported 309,574 quintals of crude rubber, valued 86,713,000 marks as compared with 294,332 quintals, valued 119,234,000 marks. Since 32,143 quintals, valued 8,676,000 marks were reexported as against 16,213 quintals, value 113,725,000 marks, the actual quantity consumed in the 1928 period was 277,431 quintals, value 76,067,000 marks as compared with 278,119 quintals value 113,725,000 marks, so that in the last analysis consumption of crude rubber in 1928 so far has slightly declined.

Exports of rubber goods during the first three quarters of 1928 came to 139,254 quintals, value 85,969,000 marks, as against 123,265 quintals, value 75,381,000 marks, the year before. That is a fair increase. However, imports of manufactured rubber also showed an increase, the figures having been 50,867 quintals, value 28,456,000 marks, against 46,148 quintals, value 28,527,000 marks, the year before. Heavier shipments of tires and tubes for bicycles from France were largely responsible for the increase in imports during the period under consideration.

Berlin Auto Exhibition

The International Automobile and Motorcycle Exhibition held at Berlin from Nov. 8-18 is considered to have been one of the most successful of its kind as far as the beauty of the exposition and the number of visitors were concerned. As usual, a large number of important German tire manufacturers had stands, but it was to be noted that foreign exhibitors of tires were conspicuous by their absence. Only the Berlin representative of the General Tire & Rubber Co., Akron, O., exhibited his firm's goods.

Among the firms showing tires were, The Continental, Gummiwerke Metzeler A. G.; Gummiwerke Titan (formerly B. Polack), Dunlop, Hannoversche Gummiwerke Excelsior, Asbest und Gummiwerke Calmon, Harburger Gummiwarenfabrik Phoenix, A. G.; Deka Pneumatik, Peters Union, Vorwerk & Sohn, Firma S. Herz. While the exhibitors vied with each other in producing attractive stands, it is to be remarked that nothing really new was shown by any of them. Some of the foremost tire manufacturers have changed the profiles on the treads with a tendency to imitate the Goodyear and other well known American tire tread designs. The use of the low pressure tire continues to increase in all directions. Most of the trucks were equipped with pneumatic tires, and the elastic tire was only used for special purposes.

In Germany, too, the use of rubber in the construction of automobiles is making remarkable headway. In the case of both trucks and passenger cars, various parts are embedded or insulated in rubber. Among the passenger cars where this use of rubber is seen in one form or the other

were Mannesmann, Stoewer, Opel and Willys Overland. Opel has as motto for his eight-cylinder car "Everything in Rubber, Everything in Oil."

German Notes

The Runge Werke, A. G., rubber reclaimer, is reported to be in difficulties. The concern, which was working with a capital of 975,000 marks, has closed down the works and the employees, numbering 260, have been dismissed. At the same time the creditors were approached with a view to reaching a settlement. The firm has assets amounting to 2,300,000 marks against liabilities of 2,200,000 marks, which would show the position not to be very serious, but unfortunately most of the assets are in the form of real estate. It is proposed to make a 50 per cent settlement, then to reduce the capital to 100,000 marks and to increase it again to 800,000 marks. The main difficulties of the firm have been the necessity to cut prices as a result of the drop in the price of crude rubber, lack of working funds and the difficulty of securing the necessary support from the banks.

A later report shows that the creditors have met and that the majority are in favor of continuing the business. The works meanwhile are closed.

A. G. Metzeler & Co., Munich. A recent report shows there is a marked improvement in the financial condition of the firm and the most difficult period has been passed. The sudden slump in the price of rubber has not been without its unfavorable effect. There is also complaint of continued hardship caused by foreign competition with its low prices. Net profits for the year came to 6,675.50 marks, which has been carried forward.

The Hannoversche Gummiwerke Excelsior is to call an extraordinary general meeting on Dec. 10 to approve the fusion with the Continental Caoutchouc & Gutta-Percha Compagnie, Hannover. The consolidation now is to be regarded as a matter of form, because to all intents and purposes the firm has been combined with the Continental for some time past as the latter controls 5,780,000 marks of the total Excelsior capital of 6,000,000 marks.

Pepege, Polski Przemyl Gumowy T. A., Graudenz, the Polish rubber works, will establish a branch at Marienburg, West Prussia, to be known as the Deutsche Gummiwerke Pepege A. G.. The new firm is capitalized at 1,000,000 marks and it is planned to produce rubber footwear, tennis shoes, sport shoes and ladies' overshoes. A suitable site has already been acquired and the work of building the factory has been started. The output is intended not only for consumption in Germany but also for export.

The Rubber Industry in the Far East

Malaya

Rubber Production

The pessimistic prophets have been doing well of late. They foretold shipments from Malaya going up to 65,000 tons in November and the amount actually exported during that month was 68,072 tons. It is expected that December shipments will beat even this. Further, the estimates of stocks on estates and in the hands of dealers here as officially published are scouted, it being considered that the official figure for September, for instance, given as 60,000 tons was far below the actual figure which some would place at as much as 30,000 tons higher.

The more optimistic of the gloomy prophets are prepared to see rubber go down to sixpence during January-March, 1929, but after that a slow but steady recovery is expected. Others foresee a serious slump lasting two or three years, and support their assertions by showing that the estimated world production will be 800,000 tons against consumption of 720,000 tons. However, the production figure is based on the assumption that the average output is 400 pounds per acre and is calculated for a planted area of 4,300,000 acres. The output per acre seems to be far too high as an average over so vast an area.

It is interesting, in this connection, to recall that the Netherlands East Indies official figure of average yield for Java and Sumatra on estates only, was 384 kilos per hectare. A kilo is 2.2 pounds and a hectare is about 2.45 acres which converted into pounds per acre brings the average a good bit below the assumed 400 pounds per acre. Then of course all sorts of things may happen. A period of low prices will probably force some estates to drop out, and then again, someone may discover a way of overcoming the difficulties in the way of rubber paving, for instance, the costs of laying and the tendency of the blocks to creep. And then we may soon have another boom instead of a slump.

New Rubber Companies

Apparently there are enough investors who still think rubber a good investment, despite all sorts of gloomy predictions, for two new rubber companies were registered on Sept. 15. They are North Malay Rubber Estates, Ltd., and Rambutan Rubber Estates, Ltd.

The North Malay Rubber Estates, Ltd., was registered as a public company with a nominal capital of £400,000 in 2 shillings shares. The objects are to acquire the undertakings and all or any part of the property and assets of Baling Rubber Estates, Ltd., incorporated in 1925, Kuala

Dingin Rubber Estate, Ltd., incorporated in 1923, and Subar Rubber Estates, Ltd., incorporated in 1925; to undertake all or part of the liabilities; to acquire estates in the Malay Peninsula or elsewhere and to carry on business of cultivators, of preparers and cultivators for market of rubber, coffee, tapioca, gambia and other produce, etc.

Rambutan Rubber Estates, Ltd., was registered as a public company with a nominal capital of £400,000 in 2 shillings shares. The objects are to acquire the undertakings and all or part of the property and assets of Rasa (Selangor) Rubber Estates, Ltd., incorporated in 1923, Sungei Raya Rubber Estates, Ltd., incorporated in 1925, and Tawar Rubber Estates, Ltd., incorporated in 1923. This company also intends to undertake the business of cultivating and preparing for market rubber, coffee, tapioca, gambia and other products.

In connection with the variety of crops it is planned to take up, it is to be noted that there is a renewed interest in coffee here. The local press is also devoting much space to propaganda for other products as Nipa palm, palm oil and more extensive cultivation of coconuts. One of the attractive points about palm oil is that it does not lend itself to cheap exploitation by the native. Which seems to be rather a curious statement in view of the fact that the palm oil industry was introduced into the East from Africa where it was a native industry.

During the previous slump the planting of other crops besides rubber was strongly advocated but not with much success, probably because if there was no money for rubber there could be none for a more or less doubtful new enterprise. It remains to be seen to what extent the present slump will stimulate interest in a variety of crops and how much actual planting will be devoted to these new crops instead of to rubber.

Firestone in Malaya

The *Malayan Tin & Rubber Journal* publishes some interesting data regarding the activities of the Firestone company in the East and more particularly in Malaya.

The Firestone Tire & Rubber Co. (Straits Settlements), Ltd., a buying organization, is established in Singapore and purchases from Malaya practically 90 per cent of all factory requirements of crude rubber. During the last four years the local Firestone organization has bought and shipped about 126,000 tons of rubber valued at \$212,500,000.

It is estimated that these figures will continue to increase as the demand for Firestone products is universal and constantly growing, so that for many years

to come Singapore will continue to be the center of raw rubber purchase for the Firestone concern. The Firestone Tire & Rubber Co.'s plant is located at Singapore, where rubber for the factories in America is washed, refined, inspected and packed. In Malaya alone Firestone has seven different buying offices and godowns. The firm employs over 500 people here. The money it has invested in Malaya in land, buildings and machinery amounts to \$1,600,000 and more, which is probably more than any other manufacturer operating locally has invested, if of course estate property is not counted.

During the last twelve months, the Firestone company has established its own selling organization in Singapore in order to market Firestone tires, as well as other well-known Firestone products. This selling organization is in charge of a British subject who controls the distribution of the company's products throughout Siam, Malaya, Straits Settlements and Dutch East Indies.

Ceylon

Rubber Census

The Ceylon rubber census for 1928 has just been published. From this it is learned that there are about 5,000 estates of ten acres and over and more than 34,700 estates with an acreage of less than 10 acres. The total area under rubber in Ceylon is 533,652 acres, of which 459,433 acres represent estates over 10 acres, and 74,219 acres or less than 14 per cent represent estates of less than 10 acres.

The most important rubber districts are Kalutara and Kegalle which each produce between one-fifth and one-fourth of the total rubber output; the Ratnapura district produces almost one-seventh and the Galle district approximately one-tenth. Only estates of over 10 acres are here considered.

Out of the total acreage of 459,433 acres represented by estates over ten acres, 201,602 acres are under rubber over 19 years old. The average rate of planting on these estates during 1910-1920 inclusive, was 18,491 acres per annum. The heaviest planting year was 1913 with 29,236 acres followed by 1920 with 25,815 acres. With the slump after 1920, extensions of planting suddenly dropped off to a remarkable extent and interest in extensions apparently was not renewed until 1925. The table below clearly shows the effects of the slump on new planting and the greater planting activity that immediately followed the rise in prices in 1925.

	Rubber Only Acres	Interplanted Acres	Total Acres
1920.....	22,690	3,125	25,815
1921.....	4,183	805	4,988
1922.....	2,897	814	3,711
1923.....	2,385	963	3,348
1924.....	3,489	492	3,981
1925.....	7,914	985	8,899
1926.....	15,933	1,560	17,493
1927.....	10,174	1,838	12,012

Of the total area of 74,219 acres representing holdings of less than 19 acres, 58,552 acres are under mature rubber, 7,912 acres are under immature rubber but are tapped and 7,755 acres are under immature rubber that has not yet been tapped.

A rather striking fact disclosed by the census is that of the total area of estates over ten acres, about 278,456 acres are owned or controlled by British Europeans while of the total area under rubber, roughly 52½ per cent, is owned or controlled by British Europeans, and the Ceylonese control 47½ per cent. The area

owned by non-British Europeans is negligible, amounting to less than one-tenth of the total rubber acreage.

Rubber Exports

The amount of rubber exported in 1926 was 131,840,505 pounds; in 1927 this fell to 125,062,578 pounds. The exports for future years are estimated as follows:

	Pounds
1928.....	130,422,400
1929.....	168,000,000
1930.....	170,240,000
1931.....	173,600,000
1932.....	179,200,000

Netherlands East Indies

Native Holdings

In an article, intended primarily to clear up the question of granting credits to native planters in the Dutch East Indies, Mr. van de Kolff gives a number of worthwhile details regarding the costs on native holdings. Native rubber cultivation shows all the variations from a plantation that started out as a rice field in which rubber was interplanted, to an undertaking that was intended from the outset for the exploitation of rubber only. Similarly, as far as practice is concerned, methods vary from the most extensive type to the more intensive. In the first instance, it may happen that the trees thus planted at haphazard and given little or no care, are so badly overtopped that after a few years they have to be abandoned in favor of a new group of trees similarly interplanted with rice that in the meantime has reached an age judged to be sufficient to permit tapping. It is worth noting, however, that in most cases abandonment of trees is primarily due to shortage of tappers and not so much to the unfit condition of the trees themselves. As a rule, therefore, native holdings have a more permanent character and there is usually sufficient bark renewal to make up for that used up.

Capital in Native Rubber

Capital in native rubber is used for clearing and planting, upkeep and exploitation. As for costs of opening up and planting, these may be practically nil where the young plants have been obtained from older plantings and are put into the ground at the same time as the rice. This of course refers to the dry method of planting rice. The greater part of the extensions after 1916 are of this type. On the other hand costs may be from 86 to 107 guilders per hectare. As for upkeep, here again the minimum may be nil, that is in districts free from that bane of rubber planters, the lalang weed, where the rubber is planted with the rice and is then allowed to grow, after the usual one or two rice crops have been harvested, as best it may among an increasing growth of young jungle. In other parts where the rubber culture is more independent there is regular upkeep and the costs may be as high as 130 guilders per

hectare, while in Tapanoei, where costs are highest, they may run up to 343 guilders per hectare. However, it must be borne in mind that these are not recurring costs but must be divided over a period of years, and then too, they are reduced by the returns received from the catch crops grown at the same time.

Exploitation costs include the clearing of passages in the rubber gardens so that the tapper can get at the trees. The real costs of exploitation include the expenses incurred by the acquisition of the necessary equipment and then the recurring expenses of tapping wages.

Plantation and Tapping Costs

Again there is a vast difference in the amount of money that is spent on a native holding for equipment. Where coconut shells or bamboo joints are used as cups, lalang or hevea leaves serve as spouts, petroleum tins for the coagulating pans, an earthenware pot holds the alum for coagulating, a bottle does service for rolling out the coagulum and the free air is the factory as in Djambi, the native planter need not worry greatly about his expenses for equipment. But on the larger estates owned by Chinese or Malay chiefs, where pottery cups and even aluminum cups are used, regular spouts are imported from Singapore and a locally contrived apparatus, to say nothing of an up-to-date iron mangle, is employed for rolling the coagulum, expenditure under this head may be 100 guilders and more.

As for tapping costs these may be nil, if as is the case on the numerous smaller holdings the members of the family do the work themselves. Of course, where holdings are more than 400 trees, outside help generally has to be obtained, and where the plantation is owned by some chief or wealthy Malay, it is naturally below the dignity of the owner to undertake this kind of work himself and it is left entirely to hired tappers. Payment, as is well-known, occurs on a fifty-fifty basis, the tapper keeps half the crop he gathers for himself. However, now when rubber prices have dropped so low, the percentage for the tapper has in many cases been increased. On the other hand a rude system of periodic tapping by which the tapper can obtain a larger quantity of latex with the same amount of labor has been found

to solve the difficulty in a great many cases.

As for the work on the plantation, this is improving greatly. People are learning to see where their best interests lie and are not slow to adopt better methods. It has been said that in the long run, the native planter would cease to be a menace to the European planter because the latter is using better planting material all the time, whereas the native uses unselected material. But we now learn that there are many of the estates where practice approaches that on good European estates, while signs are not lacking that there are people who realize the value of superior material and are willing to pay for it. Thus the advisory service in Tapanoei at the request of some native planters, bought Java seed for them at a cost of 27 guilder cents a piece. Incidentally, in this way the capital investment in rubber by natives is bound to increase too, particularly now since the government is hard at work trying by means of strict measure, to get the average small holder to prepare a better grade of rubber. One of the government requirements is that the rubber shall not exceed a certain limit in thickness which may mean that the bottle as roller will have to be discarded and something more costly but more efficient used in its place.

Tapping Systems

J. van Baalen, in a recent copy of *Bergcultures*, reports in detail regarding the results obtained with different tapping systems on the Bergen estate of which he is manager.

Referring to the conclusions he draws from his experiments, we find that during a period of 39 months the yields from alternate daily tapping and tapping every 20 days over one-half the circumference, continues to be 20 per cent higher than yields obtained by alternate daily tapping and tapping every 30 days over one-third the circumference.

On the other hand periodical tapping during 20 days over ½ the circumference and for 30 days over ⅓ of the circumference resulted in crops that were 3 per cent higher than alternate daily tapping over ½ and ⅓ circumference.

Economical Tapping Period

The most economical tapping period is that where tapping is carried out every 20 days, for in this case the maximum daily average is reached on the 12th day, whereas with the 30-day period the maximum daily average is not reached until the 24th day.

Brown Bast

As was to be expected by far the most cases were met with in those plots where the heavier tapping system was followed. However, by reducing the tapping cut by 50 per cent on trees attacked by brown bast the necessity to cut out the trees was obviated and the yield obtained from the trees was 80-90 per cent of that obtained from healthy trees.

In conclusion, the writer states that on the whole the twenty day period with tapping over half the circumference has given results which justify its continued use on the estate.

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Rubber Patents, Trade Marks and Designs

- 1,694,227. SPLICE HOLDING DEVICE FOR TIRE EXPANDERS. T. Midgley, Hampden, assignor to The Fisk Rubber Co., Chicopee Falls, both in Mass.
- 1,694,872. AIRBAG VALVE. C. Van Renner, assignor to The Goodyear Tire & Rubber Co., both of Akron, O.
- 1,694,876. TIRE BUILDING MACHINE. J. I. Haase, assignor to The Goodyear Tire & Rubber Co., both of Akron, O.
- 1,695,012 and 1,695,013. VALVE STEM ADAPTER FOR INNER TUBE MOLD. A. A. Glidden and T. M. Knowland, Watertown and W. T. Rich, Jr., Newton, assignors to Hood Rubber Co., Watertown, both in Mass.

Dominion of Canada

- 284,750. SAFETY DEVICE. The Cameron Machine Co., New York, N. Y., assignee of R. M. Johnstone, Summit, N. J., both in the U. S. A.
- 284,761. TIRE CURING BAG. The Dominion Rubber Co., Ltd., Montreal, Quebec, assignee of A. O. Abbott, Jr., Detroit, Mich., U. S. A.
- 284,762 and 284,763. MOLD MANIPULATION. The Dunlop Rubber Co., Ltd., London, N. W. 1, assignee of H. Willshaw and S. N. Goodhall, Birmingham, County of Warwick, both in England.
- 284,778. SHEET CUTTER. The Goodyear Tire & Rubber Co., assignee of L. Wetmore, both of Akron, O., U. S. A.
- 284,779. BIAS CUTTER. The Goodyear Tire & Rubber Co., assignee of E. F. Maas, both of Akron, O., U. S. A.
- 284,780. CONTINUOUS VULCANIZER. The Goodyear Tire & Rubber Co., assignee of R. W. Snyder, both of Akron, O., U. S. A.
- 285,111. TIRE FABRIC MAKING MACHINE. C. Kmentt, Youngstown, O., U. S. A.
- 285,263. WATCH CASE HEATER. The General Tire & Rubber Co., assignee of H. A. Denmire, both of Akron, O., U. S. A.
- 285,270. TUBE VULCANIZER. W. L. Fairchild, New York, N. Y., U. S. A.

United Kingdom

- 296,976†. MOLDING BY EXTRUSION. Goodyear Tire & Rubber Co., 1144 East Market St., Akron, O., assignee of L. Wetmore, 1732 Broadway, Alameda, Calif., both in the U. S. A.
- 296,983†. CUTTER. Firestone Tire & Rubber Co., (1922), Ltd., 216 Tottenham Court Rd., London, assignee of W. C. Stevens, Uniontown, O., U. S. A.
- 297,095†. AIRBAG INSERTER. Goodyear Tire & Rubber Co., 1144 East Market St., assignee of R. W. Snyder, 1015 Amelia Ave., both of Akron, O., U. S. A.
- 297,314†. COLLAPSIBLE CHUCK. Goodyear Tire & Rubber Co., 1144 East Market St., assignee of E. G. Templeton, 1568 Hillside Terrace, both of Akron, O., U. S. A.
- 297,590. TIRE MOLD EXTRUSION MACHINE. W. J. Field-House, St. Stephen's Wheel Works, St. Stephen's St., Birmingham.

† Not yet accepted.

- 297,645. RETREADING MOLD. H. A. Gill, 51 Chancery Lane, London, (Super Mould Co., 420 Sacramento St., Lodi, Calif., U. S. A.)

- 297,804†. WEB CUTTING MACHINE. Spadone Machine Co., Inc., 15 Park Row, New York, assignee of J. Wegner, 63 Mills St., Astoria, Long Island, both in N. Y., U. S. A.

- 297,811†. TIRE BAND MACHINE. Goodyear Tire & Rubber Co., 1144 East Market St., assignees of E. F. Maas, R. D. 1, Cuyahoga Falls and E. G. Templeton, 1568 Hillside Terrace, all of Akron, O., U. S. A.

- 297,819†. PILE FABRIC APPARATUS. Oryx Fabrics Corp., 768 Frelinghuysen Ave., Newark, assignee of P. S. Smith, 37 Crescent Rd., Madison, both in N. J., U. S. A.

- 297,912. FILAMENT EXTRUSION MACHINE. M. Draemann, Frondenberg, Ruhr, Germany.

- 297,935. REPAIR MOLD. Dunlop Rubber Co., Ltd., 32 Osnaburgh St., London, and H. Willshaw and T. Norcross, Fort Dunlop, Erdington, Birmingham.

- 297,946. GOLF BALL WINDING MACHINE. India Rubber, Gutta Percha, & Telegraph Works Co., Ltd., 106 Cannon St., and G. E. Turpin, of India Rubber, Gutta Percha & Telegraph Works, Silvertown, both in London.

- 298,139†. HOLLOW ARTICLE MOLD. T. L. Fawick, Box 356, Akron, O., U. S. A.

- 298,140†. INDIVIDUAL TIRE VULCANIZER MOLD. T. L. Fawick, Box 356, Akron, O., U. S. A.

Germany

- 469,348. DEVICE FOR ROLLING SHEETS. The Dunlop Rubber Co., Ltd., London, represented by Dr. R. Wirth, C. Weihe, Dr. H. Weil, M. M. Wirth, of Frankfurt a. Main, and T. R. Koehnorn and E. Noll, Berlin S. W. 11.

Process

United States

- 1,691,253. OVERSHOE. F. T. Roberts, Yonkers, and A. J. Eldon, Mt. Vernon, assignors to Paramount Rubber Consolidated, Inc., Tuckahoe, all in N. Y.
- 1,691,605. METHOD OF TREATING FABRIC. D. E. Hennessy, Milwaukee, Wis., assignor to The Fisk Rubber Co., Chicopee Falls, Mass.
- 1,692,128. TIRE FLAP. K. B. Kilborn, Fairlawn, O., assignor to Seiberling Rubber Co., a corporation of Delaware.
- 1,693,315. GOLF BALL. A. E. Penfold, Birmingham, assignor to The Dunlop Rubber Co., Ltd., London, both in England.
- 1,693,400. TIRE. L. N. Southmayd, Springfield, assignor to The Fisk Rubber Co., Chicopee Falls, both in Mass.
- 1,694,225. INSERTING VALVES IN ANNULAR TUBES. C. E. Maynard, Northampton, assignor to The Fisk Rubber Co., Chicopee Falls, both in Mass.
- 1,694,258. IMITATION LEATHER MANUFACTURE. R. C. Hartong, assignor to Seiberling Rubber Co., both of Akron, O.

Dominion of Canada

- 284,962. RUBBER ARTICLE. The Dunlop Rubber Co., Ltd., London, N. W. 1, assignee of G. G. Thornton, Birmingham, County of Warwick, both in Eng.
- 285,269. TUBE PROCESS. W. L. Fairchild, New York, N. Y., U. S. A.

United Kingdom

- 298,318. ELECTRIC CABLE. Siemens Bros. & Co., Ltd., Caxton House, Tothill St., Westminster, and A. E. Foster, Fairlawn, Old Charlton, London.

Chemical Patents

United States

- 1,691,347. EBONITE COMPOSITION.—The method comprising mixing rubber, a vulcanizing agent and sufficient pigment substantially to stiffen the mix after a momentary vulcanization, partially vulcanizing the mix in a mold, and subjecting it to further vulcanization on removal from the mold.—Harold Gray, Akron, O., assignor to The B. F. Goodrich Co., New York, N. Y.
- 1,691,460. CHICLE AND AQUEOUS COLLOID. A composition of matter having adhesive properties comprising an aqueous dispersion of chicle, a hydrophylic colloidal substance, an oil solvent for the chicle, rubber in disperse phase and an alkali.—Arthur Biddle, Trenton, N. J., assignor to United Products Corp. of America, a corporation of Del.
- 1,691,755. DENTAL PLATE AND PROCESS. The process of coating a surface of vulcanized rubber with metal which comprises first subjecting the surface to the combined action of an ammoniacal silver nitrate solution and an aqueous solution containing sugar, alcohol and a small proportion of nitric acid. Thereafter subjecting the treated surfaces to the combined action of a silver nitrate solution and gallic acid.—H. F. Buttner, Kellogg, Idaho.
- 1,691,764. GAS CELL FABRIC. The method of treating balloon fabric which comprises coating the fabric with a solution of cellulose xanthate containing acidified sodium sulphate and regenerating the cellulose upon the fabric.—W. J. Kelly, assignor to The Goodyear T. & R. Co., both of Akron, O.
- 1,694,529. ANTI-OXIDANT.—Albert M. Clifford, assignor to The Goodyear T. & R. Co., both of Akron, O.
- 1,694,879. TREATING AIRBAGS. A method of preserving the interior surfaces of airbags by introducing into the bag a solution containing glycerine and a drying oil.—Stewart S. Kurtz, Jr., assignor to The Goodyear T. & R. Co., both of Akron, O.

Dominion of Canada

- 284,980 AND 284,981. RUBBER CONVERSION PRODUCT. The method of producing conversion products of rubber, which comprises forming an admixture of rubber in solution, a phenol and an isomerizing agent for rubber, and maintaining the admixture at an elevated temperature for an extended period.—The B. F. Goodrich Co., New York, assignee of Harry L. Fisher, Leonia, both in New York, U.S.A.

United Kingdom

296,685. RUBBER DISPERSIONS. Aqueous dispersions of substances such as vulcanized or unvulcanized rubber, rubber waste, rubber reclaim, rubber substitute, synthetic resins, balata or gutta percha, or mixtures of such substances are prepared by bringing the material mechanically into plastic condition and adding successively thereto two reagents forming by mutual reaction a substance facilitating dispersion.—Anode Rubber Co., Ltd., 15 Throgmorton Ave., London. P. Klein, Budapest, Hungary and A. Szegvari, Akron, O., U.S.A.

297,051†. ACCELERATOR. A vulcanizing accelerator made by reaching a mercaptothiazole with an aldehyde amine condensation product.—The Goodyear Tire & Rubber Co., Akron, assignee of L. B. Sebrell, Cuyahoga Falls, both in O., U. S. A.

297,127. RUBBER JOINTING.—Anode Rubber Co., Ltd., 15 Throgmorton Ave., London; P. Klein and F. Gabor, 90 Thokoly-Ut, Budapest, and A. Szegvari, Akron, O., U.S.A.

297,726†. ACCELERATOR. A vulcanizing accelerator formed by treating an aldehyde-ammonia with a further quantity of the same or a different aldehyde.—Rubber Service Laboratories Co., assignee of W. Scott, 312 Beechwood Drive, both of Akron, O., U.S.A.

297,780. ELECTROPHORETIC DEPOSITION OF RUBBER.—P. Klein, 90 Thokoly-Ut, Budapest, A. Szegvari, Akron, O., U. S. A., R. F. McKay, C. Hayes, and G. V. Trobridge, Fort Dunlop, Erdington, Birmingham.

297,817†. DEVULCANIZING RUBBER. Rubber scrap containing textile insertions is subjected to contact with steam at pressures of 400 to 1,000 pounds per square inch for a period of 1 to 15 minutes, whereupon the pressure is suddenly released by discharging the contents from the pressure vessel. The scrap is thereby disintegrated, the textile material is charred or hydrolyzed, and the free sulphur is slated to be removed.—Firestone Tire & Rubber Co., Ltd., 216 Tottenham Court Rd., London, assignee of R. R. Gross, Akron, O., U.S.A.

297,850. LATEX VULCANIZING COMPOSITIONS.—Anode Rubber Co., Ltd., 15 Throgmorton Ave., London. W. C. Geer, New Rochelle, N. Y., B. Dales, Copley Township, O., and The B. F. Goodrich Co., New York, N. Y., U.S.A.

297,911. DIPPED RUBBER MOLDING. Dipping from a concentrated dispersion on a glazed porcelain or metal mold.—Dunlop Rubber Co., Ltd., 32 Osnaburgh St., London, and D. F. Twiss, Fort Dunlop, Erdington, Birmingham.

298,117. LATEX TREATMENT. The properties of rubber produced by direct deposition from aqueous dispersions on to deposition strata, wherein the thickness of the deposit is a function of the time of immersion, are improved by submitting the surfaces not in contact with the deposition strata to the action of coagulating agents before drying.—P. Klein, 90 Thokoly-Ut, Budapest, A. Szegvari, Akron, O., U.S.A., R. F. McKay, C. Hayes, and G. W. Trobridge, Fort Dunlop, Erdington, Birmingham, Eng.

Rubber Patents, Trade Marks and Designs

298,364. COLORING RUBBER. Rubber is colored an orange red by incorporating therewith the calcium salt of benzene azo 2 hydroxynaphthalene 6 sulphonic acid before vulcanization.—J. Y. Johnson, 47 Lincoln's Inn Fields, London.—I. G. Farbenindustrie, A. G., Frankfurt-on-Main, Germany.

General

United States

November 13, 1928*

1,691,198. VACUUM LIFTER. L. Jones, New York, N. Y.

1,691,219. OVERSHOE. A. D. Winn, Toronto, Ont., Canada.

1,691,336. TRANSFER ROLL. L. V. Castro, assignor to Oxford Varnish Corp., both of Detroit, Mich.

1,691,348. DRESS SHIELD. F. L. Hanauer, New York, N. Y.

1,691,385. SWIMMING SHOE. A. F. Fibiger, assignor of one-tenth to H. H. Phipps and E. J. Edwards, and five-tenths to C. Fibiger, trustee, all of Spokane, Wash.

1,691,441. TIRE PRESSURE GAGE. J. E. and M. A. Kennedy, Los Angeles, Calif.

1,691,582. SHOE PROTECTOR. E. Nowak, Brooklyn, N. Y.

1,691,658. ABDOMINAL GUARD. D. J. Kennedy, Yonkers, N. Y.

1,691,723. CUSHIONING CONNECTION. W. C. Keys, Detroit, Mich., assignor to The Mechanical Rubber Co., Cleveland, O.

1,691,742. RUNNING GEAR. E. W. Tempelin, Philadelphia, Pa., assignor to The Goodyear Tire & Rubber Co., Akron, O.

1,691,785. DENTAL MASSAGE DEVICE. O. Remensnyder, Saginaw, Mich.

1,691,894. OVERSHOE. H. Westling, Watertown, Mass.

November 20, 1928*

1,692,054. TIRE REPAIR PATCH. C. M. Semler, assignor to The Firestone Tire & Rubber Co., both of Akron, O.

1,692,095. BUMPER. D. H. Scott, assignor to The Humphrey Co., both of Cleveland, O.

1,692,143. APPARATUS FOR BATHING EYES. W. Strunz, Allersberg, near Nuremberg, Germany.

1,692,145. TIRE. H. T. Woolson, assignor to Chrysler Corp., both of Detroit, Mich.

1,692,196. FASTENING DEVICE. G. W. Blair, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

1,692,305. BALL. G. R. Jacobs, Hawthorne, N. J.

1,692,329. ABRASIVE WHEEL. G. O. Burlew, Newark, N. J.

November 27, 1928*

1,692,827. WRINGER. V. Gehrlein, assignor to Lovell Mfg. Co., both of Erie, Pa.

1,692,850. TIRE PROTECTOR. J. J. McDonauld, Westview, Pa.

1,692,881. RUBBER BLOCK USED IN MOTOR VEHICLE. L. A. Wright, Birmingham, assignor to Packard Motor Car Co., Detroit, both in Mich.

1,692,938. TOY NURSING BOTTLE. J. Jacobs, New York, N. Y.

1,693,122. SHOE. H. H. Schwartz, Scranton, Pa.

1,693,371. NIPPLE. J. O. Deegan, Toronto, Ont., Canada, assignor to Anchor Cap & Closure Corp., Long Island City, N. Y.

1,693,528. TIRE PRESSURE GAGE. N. T. Shorts, Fern, Pa.

1,693,576. CAR WHEEL. J. E. Hale, Summit County, assignor to The Firestone Tire & Rubber Co., Akron, both in O.

December 4, 1928*

1,693,729. RUBBER USED IN PRODUCING LAMINATED GLASS. J. W. H. Randall, New York, N. Y., assignor to The Libbey-Owens Sheet Glass Co., Toledo, O.

1,693,807. PAVING BLOCK. L. H. Callan, Bristol, R. I.

1,693,833. ENDLESS BAND FOR TRACTOR. G. I. Worley, Akron, O.

1,693,981. JOINT. H. D. Geyer, assignor to The Inland Mfg. Co., both of Dayton, O.

1,694,033. BRAKE SHIELD. G. R. Cunningham, Akron, assignor to The Paine-Cunnington Co., Cleveland, both in O.

1,694,232. TIRE DEFLATION SIGNAL DEVICE. R. W. Rider, Salt Lake City, Utah, assignor to Utah Royalty Corp.

1,694,233. SYRINGE. J. W. Robinson, Chicago, Ill.

December 11, 1928*

1,694,476. FLOORING. V. Lefebure, London, England.

1,694,714. LIFE PRESERVER. P. Markus, Kansas City, Mo.

1,694,756. CUSHIONED SUPPORT FOR INTERNAL COMBUSTION ENGINE. C. R. Short, Dayton, O., assignor to General Motors Research Corp., Detroit, Mich.

1,694,851. BOTTLE CAP. W. Glass, Campbell, O.

1,694,873. AIRSHIP LANDING BUMPER. E. Brunner, assignor to Goodyear-Zepelin Corp., both of Akron, O.

1,695,005. BATHING CAP. O. A. Bigler, Wyoming, O.

1,695,076. NURSING BOTTLE. L. A. Zohe, Syracuse, N. Y.

1,695,109. BABY PANTS. R. Kosloff, Jamaica, N. Y.

Dominion of Canada

November 13, 1928

284,818. HEEL. The United Shoe Machinery Co. of Canada, Ltd., Montreal, Quebec, assignee of A. Constanino, Providence, R. I., U. S. A.

November 20, 1928

284,888. LEGGING. G. K. Hodges, Montreal, Quebec.

*Under Rule No. 167 of the United States Patent Office, the issue closes weekly on Thursday, and the patents of that issue bear date as of the fourth Tuesday thereafter.

†Not yet accepted.

Rubber Patents, Trade Marks and Designs

November 27, 1928

- 285,093. LIFE PRESERVER. J. R. Free, Limerick, Saskatchewan.
285,141. ORTHOPEDIC BELT. H. M. C. Tyrel de Poix, Rueil, Seine et Oise, France.
285,224. INNER TUBE. F. W. Krone and J. C. Cohen, assignee of one-half of the interest, both of San Francisco, Calif., U. S. A.

December 4, 1928

- 285,247. GOLF BALL. G. W. Beldam, Ealing, County of Middlesex, Eng.
285,288. BELT. W. R. Mulock, Winnipeg, Manitoba.

United Kingdom

October 31, 1928

- 296,571. DOOR LATCH. C. L. Breeden, Llanbedr, Billesley Lane, Moseley, Birmingham.
296,581. GLASS CLEANER. A. Griffiths, 30 Highfield Grove, Rock Ferry, Cheshire, and Kleenglas, Ltd., 1 Victoria St., Westminster.
296,583. VASE AND FLOWER POT. C. Papworth, York Villa, and E. Jarvis, High St., both in Goudhurst, Kent.
296,595. MATTRESS USED IN PRINTING MACHINE. F. Hubl, 2 Via Trento, Trieste, Italy.
296,639. MASSAGE BRUSH. E. Brauchlin, 18 Wiedingstrasse, Zurich, Switzerland.
296,833. CORD. J. Watson, 94 Mansfield Rd., Nottingham.
296,864. ANTI-RATTLING DEVICE. J. D. Burton, (trading as Hockley Auto Co.), 2 York Terrace, Hockley Hill, Birmingham.

November 7, 1928

- 296,951. RUBBER ROAD. L. Mellersh-Jackson, 28 Southampton Bldgs., Chancery Lane, London, (E. H. Clapp Rubber Co., 213 Congress St., Boston, Mass., U. S. A.)
297,018. NON-SLIP PAVING. J. S. Cowper, 24 Queensberry Pl., South Kensington, London.
297,274. OVERSHOE. C. Kenyon of Vulcan Proofing Co., First Ave., Brooklyn, N. Y., U. S. A.
297,315†. SPRING SUPPORT. H. C. Lord, 36 Penn Bldgs., Erie, Pa., U. S. A.

November 14, 1928

- 297,437†. SPONGE. L. A. Van Bergen, Breda, Holland.
297,621. GAITER. J. E. Roux, 4 Rue de Créqui, Lyons, France.
297,660. TENNIS PRACTISING APPLIANCE. S. C. Nagle, 17 Lyric Rd., Barnes, London.

November 21, 1928

- 297,703. BOOT. Liverpool Rubber Co., Ltd., and I. W. Davies, Walton Works, Walton, Liverpool.

† Not yet accepted.

- 297,872. SHOE. British United Shoe Machinery Co., Ltd., Union Works, Belgrave Rd., Leicester, (United Shoe Machinery Corp., 205 Lincoln St., Boston, Mass., U. S. A.)
297,890. RESPIRATOR. J. A. Sadd, Experimental Station, Porton, Wiltshire.
297,932. TIRE REPAIR PAD. W. Gilbert, 1134 Chestnut St., St. Louis, Mo., U. S. A.
297,944. TOY BALLOON VALVE. H. F. Lockyer and R. U. Anderson, Basset Holt, Southampton.
297,994. MASSAGING APPARATUS. A. Jacoby, 82 Bülowstrasse, Berlin, Germany.
298,020. GOLF TEE. N. R. Jacobsen, 369 Karaka Bay Rd., Wellington, N. Z.
298,022. BLOWOUT PATCH. M. O. Haney, 710 North Chestnut St., Iola, Kans., U. S. A.

November 28, 1928

- 298,129†. CUPPING GLASS. H. Joubert, Fontaines-sur-Saone, and F. David, 24 Montée des Carmélites, Lyons, both in Rhone, France.
298,172. FILTER. S. C. Smith, 701 Salisbury House, London Wall, London.
298,191†. TIRE PRESSURE GAGE. D. Roncin, France.
298,366. BED PAN. F. G. Rees, 24 Windsor St., Uplands, Swansea.
298,388. BOTTLE PROTECTIVE DEVICE. W. A. Perry, 315 Westborough Rd., and C. R. Ginn, 11 Summercourt Rd., both in Westcliff-on-Sea.
298,421. ARTIFICIAL FOOT. J. Loth, 28 Bergstrasse, Koslin, Pommern, Germany.

Germany

- 468,377. BELT. Adolphe Kegresse, Levallois-Perret, France. Represented by W. Massohn, Berlin S. W. 61.
468,687. MASSAGE GLOVE. Hillel Zimmet, Grosse Allee, 1, Hamburg.
468,877. SUSPENDER STRIP. Franz Koske, Elisabethufer, 26, Berlin.
468,907. RUBBER FILLING. Firma C. Rauhe, Königsallee 8, Düsseldorf.
469,270. EXERCISING DEVICE. G. Arthur Schubert, Durkheimerstrasse 16, Berlin-Lankwitz.

Designs

- 1,050,414. ROCKET SHAPED COVER. Johann Fiege, Copernicusstrasse 53, and Friedrich Nelle, Himmelgeisterstrasse 119, Düsseldorf.
1,050,732. PENNANT. Semperit Oesterreichisch Amerikanische Gummiwerke, A. G., Vienna. Represented by G. Loubier, F. Harmsen, E. Meissner, and Dr. F. Vollmer.
1,051,018. TIRE TREAD. Gummiwerke Fulda, A. G., Fulda.
1,051,059. HEELS. PATCHES AND SOLES. W. Goy & Co., Schillerstrasse 19, Frankfurt a. Main.
1,051,089. DENTAL RUBBER. Firma Johannes Meiser, Aschaffenburg.

- 1,051,150. SWIMMING VEST. Firma Franz Clouth Rheinische Gummiwarenfabrik, A. G., Köln-Nippes.
1,051,275. BEACH SHOE. Radium Gummiwerke, m. b. H., Köln-Dellbrück.
1,051,379. NAIL CATCHER FOR TIRES. Friedel Berning, Limbergerstrasse 16, Osnabrück.
1,051,436. TOOL HANDLE. August Luck, Ohrdruf i. Th.
1,051,500. SCREW-ON HEEL. Karl Claus, Nordhausen a., H.
1,051,581. CATERPILLAR BAND. Maschinenfabrik Esslingen, Esslingen, Württ.
1,051,617. MASK. Georg Haertel Komm, Ges., Klopstockstrasse 57, Berlin.
1,051,624. BRUSH. Paul Kruger, Harmstrasse 71, Kiel.
1,051,632. INFLATABLE TOY. Kolnische Gummiwarenfabrik vorm. Ferd. Kohlstadt & Co., Köln-Deutz.
1,051,751. RUBBER AND LEATHER SOLING. Hannoversche Balatawerke G. m. b. H., Eichelkampstrasse 11, Hannover-Wulfel.
1,051,770. LEATHER LIKE RUBBER SHEET. Runge Werke, A. G., Spandau.
1,051,783. CONDUCTION. Hackethal-Draht-und-Kabel-Werke, A. G., Hannover.
1,051,908. NIPPLE. Withold Friedmann, Landauerstrasse 9, Berlin-Wilmersdorf.
1,052,031. EXCHANGEABLE HEEL. Johann Rewein, Landstuhl, Pfalz.
1,052,070. BATHING SLIPPER. Hungaria Gummiwarenfabrik A. G., Buda-Pest-Nagyteteny, Hungary. Represented by G. Loubier, F. Harmsen, E. Meissner and Dr. F. Vollmer, Berlin S. W. 61.
1,052,097. ELASTIC BAND. C. Aufermann & Sohne, Ludenscheid, i. W.
1,052,232. WINDOW BUFFER. Imelmann & Allgaier, Hildesheimerstrasse 25, Hannover.
1,052,592. HORSE-DRAWN VEHICLE TIRE. Hermann Graupmann, Waren i. Meckl.
1,052,830. JOKER FIGURE. Otto Furrer, Friedek, Theodor Pawelek, Witkowitz, Czecho-Slovakia, and Hermann Broedling, Alexandrinenstrasse 1, Berlin S. W. 68. Represented by Hermann Broedling, Alexandrinenstrasse 1, Berlin S. W. 68.
1,052,872. HEEL AND HOLDER FOR FOOTWEAR. Georg Böhme, Neubeibau i. Sa.
1,052,969. FOLDING BOAT. Franz Clouth Rheinische Gummiwarenfabrik A. G., Köln-Nippes.
1,053,011. MASSAGING SPONGE. Erna Kiesewalter, Liegnitzerstrasse 24, Berlin S. O. 36.
1,053,017. STOPPER FOR GLASS CONTAINERS. Dr. Frans Hesselink van Suchtelen, Theresichstrasse 36, Munich.
1,053,154. INNER TUBE. Albert Laudan, Halberstadt.

Prints

United States

- 11,350. KELLY SPRINGFIELD TIRES. Tires. Kelly-Springfield Tire Co., New York, N. Y. Published Jan. 20, 1928.
11,360. GOOD-WINGFOOT-YEAR THE GREATEST NAME IN RUBBER. Rubber. The Goodyear Tire & Rubber Co., Inc., Akron, O. Published June 1, 1928.

Trade Marks

United States

Two Kinds of Trade Marks Now Being Registered

Under the rules of the United States Patent Office, trade marks registered under the Act of February 20, 1905, are, in general, fanciful and arbitrary marks, while those registered under the Act of March 19, 1920, Section (1) (b) are non-technical, that is, marks consisting of descriptive or geographical matter or mere surnames. To be registered under the later act, trade marks must have been used for not less than one year. Marks registered under this act are being published for the first time when registered, any opposition taking the form of an application for cancellation.

November 13, 1928

Act of February 20, 1905

- 249,268. Fancy design containing the words: "DAISY SANITARY RUBBER PROTECTOR" PAT. APPL. FOR—sanitary rubber protectors, etc. Agnes L. Vierra, Salinas, Calif.
- 249,380. Fancy design containing the words: "STERLING E WORKER"—shoes of leather, rubber or fabric. C. A. Eaton Co., Brockton, Mass.
- 249,410. RAINTOG—boots, shoes and overshoes. Hood Rubber Co., Watertown, Mass.
- 249,413. SHOE CRAFT—overshoes, etc. Shoecraft Shop, Inc., New York, N. Y.
- 249,416. Fancy representation and the words: "NORWAY NYMPH"—shoes of leather, rubber, fabric, etc. Norway Shoe Co., Norway, Me.
- 249,418. Fancy representation and the word: "PARASKIN"—waterproof coats and capes. The Express Rubber Co., Ltd., London, Eng.
- 249,425. Representation of a tire and the word: "TIR-LUBEHR"—chemical and oil preparation used to prevent rubber adhering to molds during vulcanization and to lessen friction between inner and outer tire tubes. B & C Chemical Co., Ridgefield, N. J.
- 249,476. Representation of a piece of webbing in which two parallel stripes are woven—elastic webbing. Chesterman-Leeland Co., Philadelphia, Pa.

- 249,491. BUTALYDE—normal butyric aldehyde, accelerators, resins, butyric acid, etc. Commercial Solvents Corp., Terre Haute, Ind.
- 249,502. JUBILEE—dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
- 249,503. FINESSE—dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
- 249,513. ATLAS—hard rubber or pyroxylin plastic combs. The Mohawk Merchandise Co., New York, N. Y.
- 249,515. Fancy design containing the words: "MEDICO FILTERED"—spray devices. Interstate Rubber Co., New York, N. Y.

November 20, 1928

Act of February 20, 1905

- 249,608. XETAL—rubber or latex adhesives. Safety Glass & Xetal Products, Ltd., Stapleford, Eng.
- 249,655. Hexagonal border inclosing a red background on which a letter "I" appears—pneumatic tires. India Tire & Rubber Co., Akron, O.
- 249,711. Fancy representation and the words: "STRONGHEART," "SHOES," "WATCHDOG OF HEALTHY FEET"—boots

Rubber Patents, Trade Marks and Designs

and shoes of leather, rubber, etc., Simplex Shoe Mfg. Co., Milwaukee, Wis.

249,729. FLEXOVER—boots, shoes and overshoes. Hood Rubber Co., Watertown, Mass.

249,757. Fancy representation and the words: "NO-MARK" repeated twice—overshoes, shoes, arctics, rubbers, boots, soles and heels. Endicott Johnson Corp., Endicott, N. Y.

249,764. Stripes formed by the exposed edges of three layers of rubber patching material, colored red, yellow, and blue respectively—sheet rubber tire patching material and tire repair kits. Western States Mfg. Co., Sioux City, Ia.

249,765. WESTERN WELD—fan belts, tire valve pads, patches, interliners, plugs, boots and inner tubes. Western States Mfg. Co., Sioux City, Ia.

249,776. USTEX—inner tubes. United States Rubber Co., New York, N. Y.

249,782. Quadrangle containing the letters: "A. R. P. Co."—mats and floor coverings. Archer Rubber Products Co., Inc., New York, N. Y.

249,825. Representation of a triple arch; above the representation the words: "TRIPLE ARCH"—shoes of leather, rubber, fabric, etc. Given Bros. Shoe Co., El Paso, Tex.

November 27, 1928

Act of February 20, 1905

- 250,028. Fancy representation—toy rubber stamps. The Superior Tyre Co., Chicago, Ill.
- 250,103. CINDERELLA RUBBERETS—elastic bands. Rosenau Bros., Inc., Philadelphia, Pa.

Act of March 19, 1920

250,131. SPLASH-GUARD—stocking protectors. I. B. Kleinert Rubber Co., New York, N. Y.

December 4, 1928

Act of February 20, 1905

- 250,311. AIRLINE—tires. The B. F. Goodrich Co., New York, N. Y.
- 250,338. Oval containing the words: "MATADOR RUG O'RUBBER"—bath mats, J. A. Kaplan, New York, N. Y.

December 11, 1928

Act of February 20, 1905

- 250,441. Color mark shown on the edge of goods in contrasting colors, red, white and blue—tire-tube patches. H. B. Egan, Muskogee, Okla.
- 250,460. NIGHTINGALE—druggists' sundries. Seiberling Latex Products Co., Akron and Barberton, O.
- 250,461. PURITY—druggists' sundries. Seiberling Latex Products Co., Akron and Barberton, O.
- 250,462. ARISTOCRAT—druggists' sundries. Seiberling Latex Products Co., Akron and Barberton, O.
- 250,470. FOUR HUNDRED—druggists' sundries. Seiberling Latex Products Co., Akron and Barberton, O.
- 250,471. DUCHESS—druggists' sundries. Seiberling Latex Products Co., Akron and Barberton, O.

250,661. Plurality of concentric circles on the sidewall of a tire consisting of two inner semicircular beads, an intermediate serrated band colored red, as indicated by lining shown in the drawing, and two outer semicircular beads—pneumatic tires. India Tire & Rubber Co., Akron, O.

Act of March 19, 1920

250,707. WILCOX SPECIAL—belting. The Continental Supply Co., St. Louis, Mo.

Dominion of Canada

November 13, 1928

45,013. Word: "MYRA"—elastics and elastic fabrics. Jones, Stroud & Co., Ltd., Austin's Factory, Market Pl., Long Eaton, Derbyshire, Eng.

45,014. Word: "JOAN"—elastics and elastic fabrics. Jones, Stroud & Co., Ltd., Austin's Factory, Long Eaton, Derbyshire, Eng.

45,015. Word: "LUXOR"—elastic, elastic webs and elastic cords. Jones, Stroud & Co., Ltd., Austin's Factory, Market Pl., Long Eaton, Derbyshire, Eng.

November 20, 1928

45,074. Word: "RENOWN"—druggists' sundries. The T. Eaton Co., Ltd., Toronto, Ont.

45,075. Word: "RENOWN"—tires, tubes and accessories. The T. Eaton Co., Ltd., Toronto, Ont.

45,079. Word: "PARMR"—asphaltic residues and materials of similar nature for use in rubber, paint and ink industries. Binney & Smith Co., New York, N. Y., U. S. A.

December 4, 1928

45,147. Word: "DURETTE"—footwear. Gutta Percha & Rubber, Ltd., Toronto, Ont.

United Kingdom

October 31, 1928

493,391. LAFLEX—all goods included in class 38. United States Rubber Export Co., Ltd., New York, N. Y., U. S. A.

493,392. LAFLEX—soles and sheets for use in the manufacture of boots and shoes. United States Rubber Export Co., Ltd., New York, N. Y., U. S. A.

493,728. FAIRYLITE—boots, shoes, hats and caps. S. Erhard & Son, 8, Bradford Ave., London. E. C. 1.

494,553. BLONDEX—waterproof and rain-proof garments. Blond Bros., Sophia St. Works, Rochdale Rd., Manchester.

494,683. DAITAN—rubber and gutta percha goods. The Harboro' Rubber Co., St. Mary's Mills, St. Mary's Rd., Market Harborough, Leicestershire.

494,754. PREMIO—all goods included in class 37. I. T. S. Rubber Co., Ltd. Sandringham Rd., Petersfield, Hampshire.

494,788. LYNX—golf balls. The India Rubber, Gutta Percha & Telegraph Works Co., Ltd., 106, Cannon St., London, E. C. 4.

Rubber Patents, Trade Marks and Designs

November 14, 1928

- 490,139. WITCHCRAFT—garters, suspenders, etc. International Patents, Ltd., 1 St. Andrew St., London, E. C. 4.
495,444. RAPEEDUS—leggings. David Matz & Sons, Edward St. Rubber Works, Edward St., Broughton, Manchester.

November 21, 1928

- 482,172. Representation of a star containing the words: "ASBESTINE PULP," beneath the representation the words: "FROM INTERNATIONAL PULP CO.," "41 PARK ROW," "NEW YORK CITY," and "U. S. A."—pulverized, powdered and prepared silicate of magnesia for use as a filler for rubber, paper, etc. International Pulp Co., New York, N. Y., U. S. A.
490,896. Fanciful design—bandages, surgical gloves, sprays, syringes, belts, etc. Radium-Gummiwerke Mit Beschränkter Haftung, Grafenmuhlenweg 109, Kolndellbruck, Germany.
490,900. Fanciful design—rubber goods. Radium-Gummiwerke Mit Beschränkter Haftung, Grafenmuhlenweg 109, Kolndellbruck, Germany.

494,224. ECKLO—game balls. The New Eccles Rubber Works, Ltd., Monton Rd., Eccles, Lancashire.

494,225. ECKLO—game balls. The New Eccles Rubber Works, Ltd., Monton, Rd., Eccles, Lancashire.

494,755. PREMO—goods in class 40. I. T. S. Rubber Co., Ltd., Sandringham Rd., Petersfield, Hampshire.

494,798. STABLEX—rubber for use in manufactures. J. B. Crockett, Cambridge, Mass., U. S. A.

495,562. Fancy circle containing the letters: "CI"—electric insulators. The Commercial Ignition Co., Ltd., Great West Rd., Brentford, Middlesex.

495,782. VIKING—machine belting. Fleming, Birkby & Goodall, Ltd., West Grove Mills, 20, New Bond St., Halifax, Yorkshire.

November 28, 1928

488,715. Triangle containing the words: "CYCLINE" and "RUBBER SERVICE LABORATORIES"—oils used as softening agents in the curing of rubber articles. The Rubber Service Laboratories Co., Akron, O., U. S. A.

495,584. TEST MATCH—elastics. S. G. Whale, 47, Milton St., London, E. C. 2.

Designs

United States

76,867. TIRE. Term 14 years. Sigurd Holm, West Allis, Wis., assignor to The Badger Rubber Works, a corporation of Wisconsin.

76,875. TIRE. Term 14 years. J. H. Kohsiek, assignor to The Firestone Tire & Rubber Co., both of Akron, O.

76,886. TIRE. Term 14 years. R. H. Nesmith, Grosse Point Park, assignor to Morgan & Wright, Detroit, both in Mich.

76,979. HOT WATER BOTTLE. Term 14 years. H. A. Bauman, Akron, O., assignor to The B. F. Goodrich Co., New York, N. Y.

77,025. HEEL. Term 14 years. L. M. Oakley, assignor to Essex Rubber Co., both of Trenton, N. J.

77,104 and 77,105. TIRE. Term 7 years. Frank Kovacs, Akron, O., assignor to Seiberling Rubber Co., a corporation of Delaware.

77,152. COMBINED SOLE AND HEEL. Term 14 years. E. F. Greene, New York, N. Y., assignor to Revere Rubber Co., Chelsea, Mass.

77,183. SOLE. Term 14 years. L. M. Oakley, assignor to Essex Rubber Co., both of Trenton, N. J.

77,212. ELASTIC FABRIC. Term 14 years. F. J. Zimmerer, Jr., assignor to The Russell Mfg. Co., both of Middletown, Conn.

Rims Approved by Tire & Rim Association

Rim Size	November, 1928		11 Months, 1928		Rim Size	November, 1928		11 Months, 1928	
	Number	Per Cent	Number	Per Cent		Number	Per Cent	Number	Per Cent
Motorcycle									
28 x 2 1/2	...	...	...	...	High Pressure	...	...	...	...
24 x 3 "CC"	...	...	20,427	0.1	30 x 3 1/2-23	17,229	1.4	113,657	0.5
24 x 3 Std.	2,144	0.2	20,046	0.1	31 x 4-23	...	...	640	0.0
26 x 3 "CC"	...	...	2,856	0.0	32 x 4 1/2-23	8,369	0.7	102,836	0.5
26 x 3 Std.	490	0.0	48,052	0.2	33 x 4 1/2-24	7,693	0.6	92,098	0.4
28 x 3 "CC"	...	...	452	0.0	32 x 3 1/2-25	105	0.0	2,613	0.0
28 x 3 Std.	...	...	301	0.0	33 x 4-25	707	0.1	155	0.0
Clincher									
30 x 3 1/2	70,980	5.9	753,584	3.3	34 x 4 1/2-25	1,381	0.1	3,403	0.0
31 x 4	...	...	4,386	0.0	20" Truck				
18" Balloons									
18 x 3 1/2	...	...	9,362	0.0	30 x 5	230,121	18.9	2,198,868	9.6
18 x 4	36,202	3.0	1,150,421	5.0	32 x 6	35,543	2.9	439,306	1.9
18 x 3.25	...	...	148,278	0.7	34 x 7	10,775	0.9	124,528	0.5
18 x 4 1/2	17,005	1.4	154,371	0.7	36 x 8	12,645	1.1	75,804	0.3
18 x 5	1,107	0.1	10,202	0.0	40 x 10	...	...	4,241	0.0
19" Balloons									
19 x 2 1/2	43,252	3.6	201,891	0.9	22" Truck				
19 x 3 1/2	2,125	0.2	1,641,002	7.1	36 x 7	812	0.1	9,799	0.0
19 x 4	160,695	13.2	2,680,986	11.6	38 x 8	10	0.0	1,524	0.0
19 x 3.25	15,098	1.2	45,804	0.2	24" Truck				
19 x 4 1/2	43,023	3.5	889,018	3.8	34 x 5	4	0.0	15,946	0.1
19 x 5	13,240	1.1	81,476	0.3	36 x 6	2,081	0.2	38,856	0.2
20" Balloons									
20 x 2 1/2	188,816	15.6	469,473	2.0	38 x 7	2,874	0.2	51,593	0.2
20 x 3 1/2	...	...	398,888	1.7	40 x 8	4,126	0.4	31,402	0.1
20 x 4	97,622	8.0	3,130,908	13.5	44 x 10	...	...	796	0.0
20 x 4 1/2	66,776	5.5	635,106	2.8	Airplane				
20 x 5	20,522	1.7	691,429	3.0	8 x 3 SS	19	0.0	101	0.0
20 x 6	8,080	0.7	111,148	0.5	12 x 3 SS	9	0.0	352	0.0
21" Balloons									
21 x 2 1/2	7,041	0.6	4,724,082	20.4	18 x 3 SS	24	0.0	495	0.0
21 x 3 1/2	56,157	4.6	939,963	4.1	20 x 3 SS	...	...	6	0.0
21 x 4	16,310	1.3	524,741	2.3	20 x 3 1/2 SS	25	0.0	1,623	0.0
21 x 4 1/2	7,058	0.6	292,314	1.3	20 x 4 SS	71	0.0	1,171	0.0
21 x 5	363	0.0	12,121	0.1	21 x 4 SS	...	...	21	0.0
21 x 6	1,933	0.2	7,633	0.0	20 x 5 SS	...	...	98	0.0
22" Balloons									
22 x 3 1/2	...	...	1,775	0.0	20 x 6 SS	466	0.0	2,809	0.0
22 x 4	767	0.1	4,118	0.0	20 x 8 SS	149	0.0	331	0.0
22 x 4 1/2	1,014	0.1	4,826	0.0	24 x 10 SS	...	...	111	0.0
					18 x 4 CI	187	0.0	9,773	0.0
Totals						1,213,245	...	23,146,089	...

MARKET REVIEWS

CRUDE RUBBER

New York Exchange

TRANSACTIONS on the Rubber Exchange from November 26 to December 22 inclusive were 5,949 lots equivalent to 14,872.5 tons, compared with 27,257.5 tons done from October 25 to November 24 inclusive. This was a decrease of 12,385 tons or 45.5 per cent. Summarized by weekly periods the course of the market was as follows:

Trading during the week ended December 1 was moderate with very little interest evident as between buyers and sellers. December liquidation continued but not urgently as before while trade and dealer support in that month tended to keep the discount on December from widening. The undertone of the market was generally steady. Manufacturers showed little interest in the market and apparently were looking for opportunities to buy rubber cheaper due to the possibility of continued heavy exports from the primary markets. Contracts sold amounted to 3,972.5 tons. Spot ribs on "A" contracts closed at 17.40 cents. "BB" blanket crepe closed at 16.6 cents nominal. "A" contract futures closed as follows: December 17.40 cents; January 17.5 to 17.60 cents; March 17.80 cents; May 18.20 to 18.30 cents; July 18.40 to 18.60 cents; September 18.70 cents; October 18.70 to 18.80 cents.

The market closed December 8 somewhat heavy and prices were barely steady. Shipments from Malaya during the first three weeks of November as published by the Rubber Division of the Department of Commerce were very large, amounting to more than 36,000 tons, an increase of 22,900 tons over the average shipments during the first three weeks of the past 10 months.

Contracts sold amounted to 3,667.5 tons. Spot ribs on "A" contracts closed on December 8 at 17.80 to 17.90 cents. "BB" blanket crepe closed at 16.80 cents nominal. Transactions on "A" contract futures closed as follows: December 17.80 to 17.90 cents; January 17.80 cents; February 17.90 cents nominal; March 18.10 to 18.20 cents; April 18.30 cents nominal; May 18.40 cents; June 18.50 cents nominal; July 18.60 to 18.70 cents; August 18.70 to 18.80 cents; September 18.70 cents; October 18.80 cents nominal; November 18.90 cents nominal. These closing prices were slightly higher than those of the previous week.

Liquidation of the current position was apparently largely completed and good support was evident by trade and dealer interests. Shipments invoiced to the United States the past week as reported by the Department of Commerce totaled 15,583 tons of which 10,731 tons were from Malaya. From other sources the total shipments from Malaya for the last month

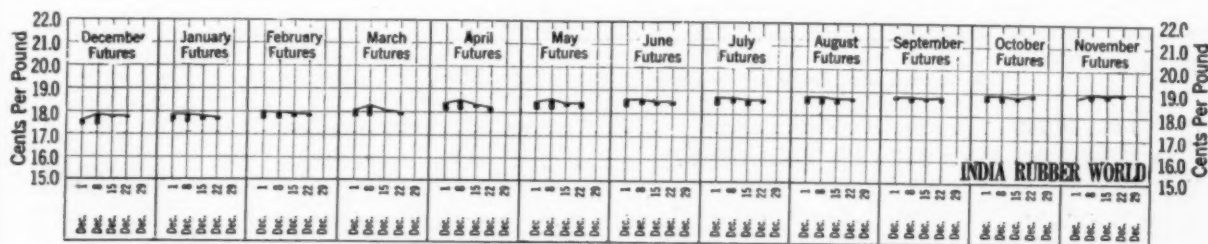
were reported 68,072 tons. News from rubber consuming centers continued favorable and no intention of slowing down of tire production was reported.

During the week terminated December 15 the markets both of New York and London were very dull and but slight variations in prices were recorded as against those of the previous week. The following statement refers to the current market position as viewed by F. R. Henderson Corp.:

The statistical position of rubber is thoroughly sound, and perhaps this is the reason actuating a very considerable interest in the commodity. The stocks in London were decreased in last week's report by 338 tons to a total of 16,517 tons. It is anticipated that there will be an increase of approximately 1,400 tons in this week's report. The stocks of rubber afloat show a decided increase over the previous month due to the increased shipments after November 1, when the restriction of exports from Malaya was removed.

Contracts dealt in during the week totaled 3,141.5 tons. Spot ribs on "A" contracts closed December 15 at 17.90 cents nominal; "BB" blanket crepe at 17.00 cents nominal. "A" contract futures closed as follows: December and January 17.70 to 17.80 cents; February 17.90 cents nominal; March 18.00 cents; April 18.20 cents nominal; May 18.40 cents; June 18.50 cents nominal; July 18.60 cents; August 18.70 cents nominal; September 18.70 to 18.80 cents; October 18.80 cents nominal; November 18.90 cents nominal.

New York Rubber Exchange—High and Low Monthly Futures



The Rubber Exchange of New York, Inc.

DAILY MARKET FUTURES—RIBBED SMOKED SHEETS—CLOSING PRICES—CENTS PER POUND—"A" CONTRACTS																								
Positions	November					December																		
1928	26	27	28	29*	30	1	3	4	5	6	7	8	10	11	12	13	14	15	17	18	19	20	21	22
December.....	17.6	17.6	17.5	...	17.4	17.5	17.4	17.5	17.6	17.8	17.9	17.8	17.7	17.8	17.8	17.7	17.7	17.8	17.8	17.7	17.8	17.8	17.8	17.8
1929																								
January.....	17.9	17.7	17.6	...	17.5	17.5	17.5	17.7	17.7	17.9	17.9	17.8	17.7	17.8	17.7	17.7	17.6	17.7	17.7	17.7	17.6	17.6	17.6	17.6
February.....	18.0	17.9	17.8	...	17.7	17.7	17.7	17.9	17.9	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.8	17.9	17.9	17.8	17.9	17.8	17.8	17.8
March.....	18.1	18.1	17.9	...	17.8	17.8	17.8	18.0	18.0	18.3	18.1	18.1	18.0	18.1	18.1	18.0	18.0	18.0	18.0	18.0	17.9	18.0	17.9	17.9
April.....	18.3	18.4	18.1	...	18.1	18.1	18.1	18.2	18.3	18.5	18.3	18.3	18.2	18.3	18.2	18.2	18.2	18.2	18.2	18.2	18.1	18.2	18.0	18.1
May.....	18.5	18.5	18.3	...	18.2	18.2	18.2	18.3	18.4	18.6	18.4	18.4	18.3	18.4	18.3	18.4	18.3	18.4	18.3	18.3	18.3	18.3	18.2	18.2
June.....	18.6	18.6	18.4	...	18.3	18.3	18.4	18.5	18.6	18.6	18.6	18.5	18.4	18.5	18.4	18.5	18.5	18.5	18.5	18.4	18.4	18.4	18.4	18.3
July.....	18.7	18.7	18.5	...	18.4	18.5	18.5	18.6	18.6	18.7	18.7	18.6	18.4	18.5	18.5	18.5	18.6	18.6	18.6	18.5	18.5	18.5	18.4	18.4
August.....	18.8	18.8	18.6	...	18.6	18.5	18.5	18.7	18.7	18.8	18.7	18.7	18.5	18.6	18.6	18.6	18.7	18.7	18.7	18.7	18.6	18.7	18.6	18.6
September.....	18.8	18.8	18.7	...	18.7	18.7	18.6	18.8	18.7	18.8	18.7	18.7	18.6	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.6	18.8	18.7	18.8
October.....	18.9	18.9	18.8	...	18.7	18.7	18.7	18.9	18.8	18.9	18.9	18.8	18.7	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.9	18.0
November.....	...	...	...	...	...	18.8	18.8	18.9	18.9	19.0	19.0	19.0	18.9	18.8	18.9	18.9	18.9	18.9	18.9	18.9	18.9	19.0	18.9	18.0

*Holiday.

Trading during the week terminated December 22 was under the influence of pre-holiday relaxation. This, combined with the statistical situation, accounts for lack of active trading interest. A fair quantity of rubber was tendered but the market did not show any new developments. London stocks increased 1,152 tons and further increases are anticipated in several weeks to follow. The market will probably remain quiet until after the opening of the new year.

Contracts dealt in during the week amounted to 4,067.5 tons. Spot ribs on "A" contracts closed at 17.90 cents nominal. "BB" blanket crepe at 16.90 cents nominal. "A" contract futures closed as follows: December 17.80 to 17.90 cents; January 17.60 cents; February 17.80 cents nominal; March 17.90 cents; April 18.00 to 18.10 cents; May 18.20 to 18.30 cents; June 18.40 cents nominal; July 18.50 cents; August 18.60 cents nominal; September 18.70 cents; October 18.80 cents nominal; November 18.90 cents nominal.

Concerning the year end stocks of crude rubber, the trade outlook and the work of the Rubber Exchange of the past year the following should be noted. The world stocks of rubber at the close of 1928 are essentially the same as at the beginning of the year. The price level, however, is less than one half what it was a year ago, namely, about 18 cents as compared with 40 cents. Stabilization at 18 cents for the past several months is favorable to a healthy start of the industry for 1929.

The Rubber Exchange is constantly growing in its usefulness to various branches of the industry. Manufacturers can obtain price insurance for their future needs and at the same time protect excessive holdings in the face of a declining market on their raw material. Perhaps the volume of business on the Rubber Exchange during the year is the best indication of its growth. Total transactions involved over 400,000 tons, or about the same amount as the country's consumption.

New York Outside Market

The lack of consumers' interest which has characterized the rubber market for weeks, or even months for that matter, was the notable feature in the open market for December. The price level was very uniform varying only from 17½ cents to 18 cents for spot ribbed smoked sheets. There was little action even at these figures. Factory consuming interests realize that rubber is cheap but had no inclination to purchase assigning such reasons as the following: the maintenance of low inventories; waiting further development of the 1929 tire schedules; continuation of heavy arrivals of crude from the Far East in the early months of the new year. They are also specially interested in what proportion of these arrivals will fall into weak hands, how much will be unsold and how much will go into storage. All interests are apparently agreed that the outlook for the rubber manufacturing industry in 1929 is most encouraging.

The general features of the outside market viewed by weekly periods were as follows:

The market for the week ended December 1 was very quiet and dull. Prices gradually eased off but the factories refused to be hurried into buying rubber and lowered their bids ¼ to ½ cent on every sign of weakness. All actual inquiries were under market levels. Shipment offers held quite firm and little business passed. Dealers will probably hold off until new market developments appear or until after January 1 when the destination of the current heavy imports may be apparent.

Closing spot prices were: ribs 17½ cents buyers, 17¼ cents sellers; first latex 18¼ cents buyers, 18½ cents sellers; "B" blanket crepe 16¾ cents buyers, 16¾ cents sellers; "C" blanket crepe 16¼ cents buyers, 16½ cents sellers.

Paras were very quiet and neglected in sympathy with plantations. Buyers made

low bids and took only cheap offers. Upriver fine was quoted at 19¼ cents buyers, 19½ cents sellers. Balatas were fairly firm and showed strength. Dealers were holding supplies but very little factory inquiry appeared.

The market of the week closed December 8 differed but little if any from that of the week before. It was steady and dull with buyers holding off hoping for chances to pick up cheap lots. The eastern markets refused to sell at low figures and in fact offered rubber at prices higher than those prevailing in New York during the week, however, very little business was effected. Prices advanced fractionally toward the end of the week.

Closing spot prices were: ribs 18 cents buyers, 18½ cents sellers; first latex crepe 18½ cents buyers, 19 cents sellers; "B" blanket 16¾ cents buyers, 16¾ cents sellers; "C" blanket crepe 16½ cents buyers, 16½ cents sellers.

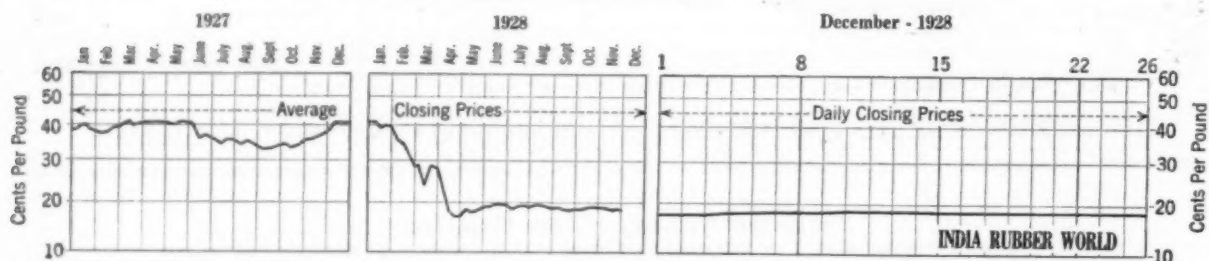
Paras remained very steady. The sellers in the primary market refused low bids and often did not make counter offers in return. Upriver fine was quoted at 19¼ cents buyers, 20 cents sellers. Balatas remained quiet and steady but with no firmness and little pressure to sell.

The market of the week terminated December 15 was extremely dull during the entire period with practically no change in prices. Some factories were still holding off waiting for a drop but dealers held their prices at ½ cent over bids and were not inclined to sell.

Closing spot prices were: ribs 17½ cents buyers, 18 cents sellers; first latex 18¼ cents buyers, 18½ cents sellers; "B" blanket crepe 16¾ cents buyers, 16¾ cents sellers; "C" blanket crepe 16¼ cents buyers, 16½ cents sellers.

Paras were very steady with little inclination in the primary markets to sell and all bids were refused except at full prices. Upriver fine prices were 19½ cents buyers, 20 cents sellers. Balatas continued very quiet with asking prices at slightly

New York Outside Market—Spot Closing Prices Ribbed Smoked Sheets



New York Outside Market—Spot Closing Rubber Prices—Cents Per Pound

PLANTATIONS	November, 1928					December, 1928																		
	26	27	28	29*	30	1	3	4	5	6	7	8	10	11	12	13	14	15	17	18	19	20	21	22
Sheet																								
Ribbed smoked	17½	17½	17½	....	17½	17½	17½	17½	17½	17½	18	17½	17½	18	18	18	18	17½	17½	17½	17½	17½	17½	17½
Crepe																								
First latex	18½	18½	18½		18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½
"B" blanket	16½	16½	16½		16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	17	17	16½	16½	16½
"C" blanket	16½	16½	16½		16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½
"D" blanket	16½	16½	16½		16½	16	16	16	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½
No. 2 brown	16½	16½	16½		16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½
Roller brown	14½	14	14		13½	13½	16½	16½	16½	16½	16½	16½	16½	13½	13½	13½	13½	13½	13½	13½	13½	13½	13½	13½
Off latex	18½	18½	18½		18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½

* Holiday

higher levels but very little business passing.

The market of the week ended December 22 was absolutely flat with practically no change in prices. The trade simply held off awaiting developments and the approaching holidays slowed up business. Dealers were quietly evening up their affairs and awaiting developments.

Closing spot prices were: ribs 17½ cents buyers, 18 cents sellers; first latex crepe 18¾ cents buyers, 18½ cents sellers; "B" blanket crepe 16½ cents buyers, 17 cents sellers; "C" blanket crepe 16½ cents buyers, 16¼ cents sellers.

Paras remained very quiet. Upriver was quoted at 19¼ cents buyers, 20 cents sellers. Balatas were practically neglected.

November Imports

Importations of all grades in November were 34,720 tons, compared with 40,634 tons one year ago. Plantation arrivals for November were 33,771 tons, compared with 33,301 tons one year ago. Total importations of plantation rubber for eleven months ended November 30 were 383,705 tons compared with 379,486 tons for the corresponding period of 1927. Total importations of all grades of rubber for the 11 months ended November 30 were 399,-

581 tons compared with 402,803 tons for the corresponding period of 1927.

RUBBER AFLOAT TO THE UNITED STATES

Week Ended	Netherland London				
	British Malaya	Ceylon	East Indies	Liverpool	Total
Nov. 24.	13,920	935	1,911	363	17,129
Dec. 1.	10,731	1,265	2,624	963	15,583
Dec. 8.	10,061	1,443	1,694	17	13,215
Dec. 15.	9,785	1,661	2,215	330	13,991
Dec. 22.	10,697	1,766	1,642	96	14,201

London

The London market from November 26 to December 22 ruled dull with spot prices very steady around 8½ pence. The only exception being on December 6 when good business was done and the price rose to 9½ pence for spot. It is reported that producers, dealers and manufacturers have all assumed a waiting attitude. The manufacturers evidently have in mind that with a sufficiency of rubber available there is no need of hurry to obtain supplies as they consider that the market is not likely to advance or make any decided change for some weeks at least.

The market closed for the Christmas holidays from December 22 to 27. The closing prices on the twenty-second were as follows: spot ribs 8½ pence buyers, 8½ pence sellers; December 8½ pence buyers, 8½ pence sellers; January 8½

pence buyers, 8½ pence sellers. All future positions were nominal as follows: January-March 8½ pence; April-June 8½ pence; July-September 9½ pence; No. 3 amber crepe 7½ pence.

The weekly record of London stocks since November 24 is as follows: December 1, 16,855 tons; December 8, 16,517 tons; December 15, 17,669 tons; December 22, 18,821 tons.

Singapore

Conditions of the rubber market for the first half of November were as follows, according to Guthrie & Co., Ltd.

An ominous quietness pervaded the commodity market from November 1 to 8. It was considered as not improbable that the advent of free export will be signalized by a drop in values as the more prominent buying interests were holding off. As recorded November 16 the marketing of the surplus stock had begun and values dropped under selling pressure. The parity between standard and off-grades perceptibly widened. Business during the week was confined chiefly to the November-December position. The rather free offerings were fairly well taken for factory account. Future transactions were negligible. The interest of the market centered in deliveries and shipments.

New York Quotations

Following are the New York open market rubber quotations for one year ago, one month ago and December 26, the current date

Plantation Hevea		December 27, 1927	November 26, 1928	December 26, 1928	South American		December 27, 1927	November 26, 1928	December 26, 1928
RUBBER latex (Hevea) gal.		\$1.50 @	\$1.40 @	\$1.40 @	PARAS—Continued				
CREPE					Peruvian, fine		\$0.32 @	\$0.20¼ @	\$0.19 @
First latex spot		.41 @	.19 @.19½	.18½ @	Tapajos, fine		.31½ @	.20 @	.19½ @
December		.41 @	.19 @.19½	.18½ @.18¾	CAUCHO				
January-March		.41½ @	.19 @.19½	.18¾ @	Upper caucho ball		.27½ @	.13 @	.13 @
April-June		.42½ @	.19½ @.19¾	.18¾ @	Upper caucho ball		*.38½ @	*.20½ @	*.19½ @
Off latex, spot		.40½ @	.18¾ @	.18¾ @	Lower caucho ball		.26 @	.12½ @	.12½ @
"B" Blanket, spot		.39 @	.17 @	.17 @	Maniobas				
December		.39 @	.17 @	.17 @	Ceará negro heads		.25 @	†.17 @	†.17 @
January-March		.39½ @	.17½ @	.17 @	Ceará scrap		.16 @	†.09 @	†.09 @
April-June		.40¼ @	.17¾ @.17½	.17½ @	Manioba, 30% guaranteed		.30 @	†.19 @	†.19 @
"C" Blanket, spot		.38¾ @	.16¾ @	.16¾ @	Mangabiera, thin sheet		.32 @	†.19 @	†.19 @
Brown No. 1		.38 @	.17 @	.16¾ @.17	Centrals				
Brown No. 2		.37 @	.16¾ @	.16½ @.16¾	Central scrap		.27½ @	.13 @	.11¼ @.12
Brown, roll		.34¾ @	.14 @.14½	.13½ @.13¾	Central wet sheet		.20 @	.10 @	.08 @.10
Sheet					Corinto scrap		.27½ @	.13 @	.11½ @.12
Ribbed, smoked spot		.40½ @	.18 @	.17¾ @.18	Esmeralda sausage		.27½ @	.13 @	†.11½ @
December		.40½ @	.18 @	.17¾ @.18	Guayule				
January-March		.41½ @	.18½ @	.18 @.18½	Duro, washed and dried		.32½ @	.17½ @	.17½ @
April-June		.42½ @	.18¾ @	.18¾ @.18½	Ampar		@	.18½ @	.18½ @
East Indian					Gutta Percha				
PONTIANAK					Gutta Siak		.22 @	.25 @	.23¼ @
Banjermasin		.09½ @.10	.11 @	.11 @	Gutta Soh		.35 @	.37 @	†.35 @
Pressed block		.15 @	.20½ @	.20 @.21	Red Macassar		3.00 @	2.90 @	2.95 @
Sarawak		.10 @	@	†.10 @	Balata				
South American					Block, Ciudad Bolivar		.45 @	.50 @	.49 @.51
PARAS					Colombia		.44 @.45	.47½ @	.48 @
Upriver, fine		.33 @	.20½ @	.20 @	Manaos block		.47 @	.56 @	.55 @.57
Upriver, fine		*.42¼ @	*.24½ @	*.25¼ @	Panama		.44 @	.47½ @	.48 @
Upriver, coarse		.27½ @	.14 @	.14¼ @	Surinam sheet		.56 @	.50½ @	.49 @.50
Upriver, coarse		.38½ @	*.20½ @	*.19½ @	Amber		.60 @	.53 @	.53 @.55
Islands, fine		.29 @	@	@	Chicle				
Acre, Bolivian, fine		.41 @	*.24 @	*.25¼ @	Honduras		.68 @	.68 @	.68 @
Acre, Bolivian, fine		.33½ @	.21 @	.20¾ @	Yutacan, fine		.68 @	.68 @	.68 @
Beni, Bolivian, fine		.43 @	*.25 @	*.26½ @	*Washed and dried crepe. Shipment from Brazil. †Nominal. ‡Duty paid.				
Madeira, fine		.34½ @	.22 @	.21 @					
		.33 @	.21 @	.20 @					

Low and High New York Spot Prices

PLANTATIONS	December 1927		December 1928	
	1928*	1927	1928	1927
First latex crepe	\$.018½ @ \$.019	\$0.39¼ @ \$0.41¼	\$0.36¾ @ \$0.39¼	\$0.39¼ @ \$0.39¼
Smoked sheet, ribbed	.17½ @ .18½	.39¼ @ .41½	.36¾ @ .39¼	.39¼ @ .39¼
PARAS				
Upriver, fine	.19¼ @ .20	.30½ @ .35	.31 @ .33	.31 @ .33
Upriver, coarse	.13¼ @ .14½	.24¼ @ .27¼	.21 @ .23	.21 @ .23
Islands, fine	.18½ @ .19¼	@ @	.26 @ .29	.26 @ .29

*Figured to December 22, 1928.

LOCAL PAPERS PUBLISH THE REPORT OF BELGIAN EXPERIMENTS with synthetic rubber. According to these sources, the Belgian Chemical Trust, Union Chimique Belge, is working on a process for the production of synthetic rubber.

DURING THE FIRST SIX MONTHS OF 1928, RUBBER TO THE AMOUNT of 331,451 kilos was shipped from Para to Southern Brazil for use in Brazilian manufacturing. The local industry produces tennis shoes and some mechanical rubber goods.

RECLAIMED RUBBER

DESPITE the drastic decline in the price of crude rubber during the first 4 months of 1928, from 40 to 18 cents and its maintenance at the lower figure most of the year, the production and consumption of reclaimed rubber reached a tonnage much in excess of that in any preceding year. For the first time in the history of the industry leading reclaiming companies operated their plants on three shifts daily and continuously throughout 1928.

The outlook based on tentative tire manufacturing programs indicates continued heavy demand for reclaims for at least the first half of 1929.

The technical value of reclaim grades is maintained with remarkable constancy,

assuring them a continued strong position in the rubber industry even with crude at present levels.

Announcement has been made in the past month of the completion of a new reclaiming plant located in the Mississippi valley. This will add about 25 tons' capacity of standard reclaims or 7,500 tons annually. As this amount will not equal the probable increase in reclaim consumption in 1929 the advent of the new company's output will not overbalance the demand.

New York Quotations

December 26, 1928

High Tensile	Spec.	Grav.	Price Per Pound
Super-reclaim, black..	1.20	\$0.12	@ \$0.12½
red	1.20	.12½	@ .13

RUBBER SCRAP

THE rubber scrap demand for December was maintained at the high level that has characterized its consumption for months past. In fact the total consumption for the year estimated one year ago at 180,000 tons will practically be realized. Stocks of scrap tires are not greatly in excess. The demand for them continues good. Prices are not liable to fall off, because of the usual winter restriction of collections when heavy weather sets in.

White tire scrap is a decreasing factor in the scrap market. That, with beads, has dropped \$5 per ton, while beadless has dropped \$10 per ton. The other tire grades remain unchanged.

Boots and shoes are firm and in fairly good demand for insulation and auto topping, proofing, reclaims, etc.

All grades of inner tubes are in

moderate demand at unchanged prices.

Hard rubber scrap, No. 1 grade, is practically out of the market.

Export demand for Europe continues to be good and is confined practically to inner tubes.

The outlook for good business in rubber scrap for the first half of 1929 is reported excellent, in conformity with the scheduled prospects of general rubber goods manufacture.

Quotations are virtually unchanged from those of the past month.

CONSUMERS' BUYING PRICES

Carload Lots

East of Pittsburgh, Pa.

December 26, 1928

Boots and Shoes	Prices
Boots and shoes, black....lb.	\$0.01½ @ \$0.0145
Untrimmed arctic.....lb.	.00¾ @ .00¾
Tennis shoes and soles....lb.	.00¾ @ .01

Auto Tire	Spec.	Grav.	Price Per Pound
Black	1.21	\$0.07½	@ \$0.07¾
Black selected tires.....	1.18	.08	@ .08¾
Dark gray	1.35	.09½	@ .09¾
Light gray	1.38	.12	@ .12¾
White	1.40	.13	@ .13¾

Shoe	Spec.	Grav.	Price Per Pound
Unwashed	1.60	.07¾	@ .07¾
Washed	1.50	.10	@ .10¾

Tube	Spec.	Grav.	Price Per Pound
No. 1	1.00	.13½	@ .14
No. 2	1.10	.10½	@ .11

Miscellaneous	Spec.	Grav.	Price Per Pound
Red	1.35	.12½	@ .13
Truck tire, heavy gravity	1.55	.07	@ .07¾
Truck tire, light gravity	1.40	.07¾	@ .07¾
Mechanical blends.....	1.60	.06¾	@ .07¾

Mechanicals	Prices
Mixed black scrap.....lb.	\$0.00½ @ \$0.00½
Hose, air brake.....ton	32.50 @ 35.00
regular soft	17.50 @ 20.00
No. 1 red.....lb.	.02 @ .02½
No. 2 red.....lb.	.01 @ .01½
White druggists' sundries..lb.	.02 @ .02½
Mechanical .....	.01½ @ .01½

Tires	Prices
Pneumatic Standard—	
Mixed auto tires with beads	23.50 @ 24.50
Beadless	32.00 @ 34.00
White auto tires with beads	40.00 @ 42.00
Beadless	50.00 @ 52.50
Mixed auto peelings.....ton	34.00 @ 36.50
Solid—	
Mixed motor truck, clean	19.00 @ 20.00

Inner Tubes	Prices
No. 1, floating.....lb.	.06½ @ .06¾
No. 2, compounded.....lb.	.04 @ .04½
Red .....	.05½ @ .05¾
Mixed tubes .....	.04½ @ .04¾

Hard Rubber	Prices
No. 1 hard rubber.....lb.	.08 @ .08½

United States Imports of Crude Rubber and Liquid

Latex—By Countries

	Crude Rubber		Liquid Latex	
	Pounds	Value	Pounds†	Value
Belgium	120,848	\$14,061		
France	302,524	39,529		
Germany	100,950	20,919		
Netherlands	65,060	12,742		
United Kingdom.....	4,354,564	813,886		
Nicaragua	224	52		
Bolivia	5,390	415		
Brazil	1,369,751	224,556		
Colombia	1,822	487		
Ecuador	6,320	896		
British Guiana.....	56,000	9,989		
Surinam	7,990	3,085		
Pern	32,625	5,989		
Venezuela	12,930	1,913		
British India.....	168,247	38,778		
British Malaya.....	55,556,092	10,091,799	896	\$302
Ceylon	7,264,898	1,362,041		
China	22,442	6,039		
Java and Madura.....	10,316,402	2,005,246	313,333	56,844
Other Netherland East Indies..	8,153,805	1,593,828	502,079	110,411
Palestine	145,600	26,188		
Persia	24,075	4,003		
Philippine Islands.....	48,224	16,425		
Australia	10,502	2,621		
New Zealand.....	3,738	1,347		
Liberia	32,177	3,830		
Totals.....	88,183,200	\$16,300,674	816,308	\$167,557
Long tons.....	39,368		364	

*Imports of Guayule rubber from Mexico during September, 1928, totaled 867 pounds, valued at \$156. Total rubber imports amounted to 39,732 long tons.

†Pounds of dry rubber contained in latex imported; crude rubber content is taken as three pounds per gallon of latex.

Reclaimed Rubber in Germany

At the close of the war, it was estimated that for 1920, 1,000 tons of reclaim would be produced in Germany by independent reclaimers, and 3,000 tons by rubber manufacturers which have their own reclaiming plants. The actual 1920 consumption of reclaim in Germany was much less than the advance estimate, and one of the two German reclaimers turned his plant over to general rubber manufacture. Since 1920 conditions in respect to use of reclaim in Germany have changed relatively little. In 1927, reclaim consumption in Germany is estimated at 4,500 tons, 3,000 tons produced in general rubber factories, 1,200 tons by independent reclaimers, 300 tons imported.

Twenty-four Million Cars in Europe

As compared with the United States, Europe makes a poor showing in per capita ownership of automobiles, but that condition may change sooner than many expect. Dr. Gustav Egloff told the International Conference on World Fuel in London recently that with improved legislation, reduced taxation, and wider roads, Europe within ten years should have 24,000,000 motor vehicles. Perhaps American tire concerns in setting up branch factories overseas have builded better than they knew. At any rate they will be in position to get a good share of the big business when it comes along later.

The I. G. Dye Industries, it is reported, is testing tires made of synthetic rubber on the Nurburg Ring. It seems that a Mercedes-Benz car and a Simson-Supra car have been fitted with these tires for the purpose.

COMPOUNDING INGREDIENTS

NOTWITHSTANDING the approach of the annual inventory period the demand for the standard lines of compounding materials continued very active during December, based on the heavy tire and other rubber goods schedules for the early months of 1929.

ACCELERATORS. The popular accelerators are entering consumption in ever-increasing totals. Development continues in this line and tested new materials may be expected from time to time.

ANTI-OXIDANTS Anti-oxidants are gaining in favor. With these as with accelerators choice is regulated by special conditions of service. Research is active in this field to develop the best of special needs.

BENZOL. Consuming demand is good and gaining distinctly in breadth.

CARBON BLACK. The past year afforded increasing use of carbon black for tire manufacture and other rubber goods subject to abrasive wear in service. The increased production of tires indicated for the 1929 season has already been reflected in heavy contract provisions of rubber goods manufacturers for carbon blacks.

CLAY. The use of clay bulks large among ingredients for rubber compounding because of its cheapness and practical reinforcing value.

DEGRAS. Degras as a softening material and for its acid value in cures finds favor with many compounders and maintains a steady increase in demand.

LITHARGE. Trade in litharge for rubber goods manufacture is in steady routine and hand-to-mouth volume demand

with no recent price variations worth recording.

LITHOPONE. The active demand for this material is reported to have resulted in the booking of production capacity with the close of 1928.

MINERAL RUBBER. Technical qualities, general adaptability and price favor the steady increase in the consumption of this rubber maker's necessity.

SOLVENT NAPHTHA. This naphtha specialty is reported sold ahead with consequent firm prices in effect.

V. M. P. NAPHTHA. This grade for cement and proofing purposes is temporarily in slower demand with prices unchanged.

STEARIC ACID. Prices firm and demand active for this cure stabilizing ingredient.

ZINC OXIDE. Spot demand was dull the past month. Trade became routine but good inquiry appeared for 1929 manufacturing needs.

Accelerators, Inorganic

Lead, carbonate.....lb.	\$0.08 1/2 @
Lead, red.....lb.	.10 @
sublimed white.....lb.	.07 3/4 @
sublimed blue.....lb.	.07 3/4 @
super-sublimed white lead.....lb.	.08 @
lime, R. M. hydrated.....ton	20.00 @ 25.00
Litharge.....lb.	.09 @
Magnesia, calcined heavy.....ton	90.00 @
Magnesia, carbonate.....lb.	.06 @ .07
orange mineral A.A.A.....lb.	.12 @

Accelerators, Organic

A-7.....lb.	.55 @ .65
A-11.....lb.	.62 @ .75
A-16.....lb.	.57 @ .65
A-19.....lb.	.58 @ .75
A-20.....lb.	.64 @ .80
A-32.....lb.	.78 @ .95
Aero X.....lb.	.65 @ .70
Aldehyde ammonia.....lb.	.65 @ .70
B. B.....lb.	.65 @ .70
Captax.....lb.	.65 @ .70
Crylene, hard form.....lb.	.65 @ .70
Paste.....lb.	.65 @ .70
Di-ortho-tolylguanidine.....lb.	.44 @ .46 1/2
D. P. G.....lb.	.35 @ .37 1/2
Ethylidine aniline.....lb.	.45 @ .47 1/2
Formaldehyde aniline.....lb.	.37 1/2 @ .42 1/2
Grassclerator 102.....lb.	.62 1/2 @ .63 1/2
352.....lb.	4.45 @
808.....lb.	.80 @ .85
833.....lb.	1.17 @ 1.35
Heptene.....lb.	.62 1/2 @ .65
Hexamethylene tetramine.....lb.	.15 1/2 @ .15
Lead oleate, No. 999.....lb.	.15 @ .15
Witco.....lb.	.37 1/2 @ .40
Methylene dianiline.....lb.	.37 1/2 @ .40
Monex.....lb.	.37 1/2 @ .40
Piperidine pentamethylene dithio carbamate.....lb.	4.45 @ 4.60
Plastone.....lb.	2.00 @ 2.50
R-2.....lb.	.40 @ .42 1/2
R. & H. 40.....lb.	.40 @ .42 1/2
50.....lb.	.40 @ .42 1/2
Safex.....lb.	.40 @ .42 1/2
Super-sulphur, No. 1.....lb.	.50 @ .52 1/2
No. 2.....lb.	.50 @ .52 1/2
Tensilac No. 39.....lb.	.50 @ .55
No. 41.....lb.	.50 @ .55
Thermite F.....lb.	3.25 @ .25 1/2
Thionex.....lb.	.25 1/2 @ .26 1/2
Thiocarbamid.....lb.	.25 1/2 @ .26 1/2
Trimene.....lb.	.58 @ .62 1/2
base.....lb.	.58 @ .62 1/2
Triphenylguanidine.....lb.	.58 @ .62 1/2
Tuads.....lb.	.58 @ .62 1/2
Vulcanex.....lb.	.58 @ .62 1/2
Vulcanol.....lb.	.58 @ .62 1/2
Vulcone.....lb.	.58 @ .62 1/2
ZBX.....lb.	.50 @ .60
Z-88.....lb.	.50 @ .60
Zimate.....lb.	.50 @ .60

Acids

Acetic 28% (bbls.).....100 lbs.	3.88 @ 4.13
glacial (carboys).....100 lbs.	14.18 @ 14.43
Sulphuric, 66%.....100 lbs.	1.60 @

New York Quotations

December 26, 1928

Alkalies

Caustic soda, solid.....lb.	\$0.03 @
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Anti-Oxidants

Age-Rite, powder.....lb.	@
resin.....lb.	@
white.....lb.	@
Antox.....lb.	.55 @
Neoxone.....lb.	.69 @
A.....lb.	.61 @
Oxynone.....lb.	.68 @ .90
Resistox.....lb.	.54 @ .65
Stabilite.....lb.	.64 @
V. G. B.....lb.	@

Colors

BLACK	
Bone.....lb.	.07 @ .08 1/2
Carbon (see compounding ingredients)	
A. & W. nonfl No. 1.....lb.	.40 @
Drop.....lb.	.05 1/2 @ .15
Gastex.....lb.	.05 1/2 @ .07
Lampblack (commercial).....lb.	.09 @
BLUE	
A. & W. blue.....lb.	1.25 @ 5.00
Akco blue.....lb.	1.80 @
Du Pont, N.....100 lbs.	1.35 @
Marine, A. C.....100 lbs.	1.30 @
5 R.....100 lbs.	1.00 @
2 G.....100 lbs.	.70 @
Huber Brilliant.....lb.	4.20 @ 4.70
Prussian.....lb.	.32 @ .35
Ultramarine.....lb.	.06 @ .30

BROWN

Huber Mocha.....lb.	1.60 @ 2.10
Sienna, Italian, raw.....lb.	.05 1/2 @ .12 1/2
GREEN	
A. & W. green.....lb.	2.60 @
Akco green.....lb.	.27 @ .31
Chrome, light.....lb.	.28 @ .31
medium.....lb.	.30 @
Du Pont, A. C.....100 lbs.	.60 @
4 G.....100 lbs.	.30 @
G. L.....100 lbs.	.75 @
Y. L.....100 lbs.	.435 @
Huber Brilliant.....lb.	.34 @ .38
Oxide of chromium.....lb.	.34 @ .38

ORANGE

Du Pont, 2 R.....100 lbs.	1.40 @
R. X.....100 lbs.	1.30 @
Y. O.....100 lbs.	1.60 @
Huber Persian.....lb.	.50 @ 1.00
RED	
A. & W. red.....lb.	0.75 @ 2.50
purple.....lb.	1.25 @ 2.00
Akco red.....lb.	2.75 @
Antimony, golden, No. 40.....lb.	.16 @ .20
No. 60.....lb.	.20 @ .23
golden 15/17%.....lb.	2.75 @
Aristi.....lb.	1.35 @ 1.85
Huber Brilliant.....lb.	1.35 @ 1.85

Colors—(Continued)

RED

Antimony	
Crimson, R.M.P. No. 3.....lb.	\$0.48 @
Sulphur free.....lb.	.52 @
7-A.....lb.	.35 @
Z-2.....lb.	.22 @
Vermilion, No. 5.....lb.	@
No. 15.....lb.	@
Du Pont, R. I.....100 lbs.	1.75 @
6 B.....100 lbs.	.90 @
Brilliant A. C.....100 lbs.	.90 @
Iron Oxides	
bright pure domestic.....lb.	.12 @
bright pure English.....lb.	.14 @
bright reduced English.....lb.	.10 @
bright reduced domestic.....lb.	.10 @
Indian (maroon), pure domestic.....lb.	.11 @
Indian (maroon), pure English.....lb.	.10 1/2 @ .11
Indian (maroon), reduced English.....lb.	.09 @
Indian (maroon), reduced domestic.....lb.	.08 @
Oximony.....lb.	.13 1/4 @
Spanish red oxide.....lb.	.04 @
Sunburnt red.....lb.	.14 1/2 @
Venetian reds.....lb.	.02 1/2 @ .06
Vermilion, Eng. quicksilver.....lb.	1.95 @

WHITE

Lithopone.....lb.	.05 1/4 @
Albalith.....lb.	.05 1/4 @ .05 3/4
Azolith.....lb.	.05 1/4 @ .05 3/4
Grasselli.....lb.	.05 1/4 @ .05 3/4
Sterling.....lb.	.05 1/4 @ .05 3/4
Vanolith.....lb.	.05 1/4 @ .05 3/4
Titanox.....lb.	.09 1/2 @ .10
Zinc Oxide	
AAA (lead free).....lb.	.07 @
Azo (factory):	
ZZZ (lead free).....lb.	.06 1/4 @ .07
ZZ (lead).....lb.	.06 1/4 @ .06 3/4
Z (8% lead).....lb.	.06 1/4 @ .06 3/4
French Process	
Green seal.....lb.	.10 1/4 @ .10 3/4
Red seal.....lb.	.09 1/4 @ .09 3/4
White seal.....lb.	.11 1/4 @ .11 3/4
Kadox.....lb.	@
XX.....lb.	@

YELLOW

A. & W. yellow.....lb.	1.60 @ 4.00
Akco yellow.....lb.	1.45 @
Cadmium sulphide.....lb.	.75 @ .85
Chrome.....lb.	.15 1/4 @ .16 1/4
Du Pont N.....100 lbs.	4.00 @
R. W.....100 lbs.	.78 @
Grasselli cadmium.....lb.	@
Huber canary.....lb.	3.30 @ 3.80
Ochre, domestic.....lb.	.01 1/2 @ .02 1/2
Ochre, pure.....lb.	.02 1/2 @
Zinc, C. P., imported.....lb.	.23 @

Compounding Ingredients

Aluminum flake (sacks, c.l.).....100 lbs.	21.85 @
(sacks l.c.l.).....100 lbs.	24.50 @
Ammonium carbonate p.wd.....lb.	.12 @ .13
lump.....lb.	.11 @ .12
Asbestine.....100 lbs.	13.40 @ 14.50
Barium, carbonate.....100 lbs.	57.50 @ 60.00

Compounding Ingredients (Continued)

Baryta white (f.o.b. St. Louis, bbls.)	ton	\$23.00	@
Baryta white (f. o. b. St. Louis, bags)	ton	22.20	@
Barytes, imported	ton	27.00	@34.00
pure white	ton	35.00	@
off color	ton	27.50	@
medium	ton	30.00	@
Foam "A" (f. o. b. St. Louis, bbls.)	ton	23.00	@
Foam "A" (f. o. b. St. Louis, bags)	ton	23.00	@
Basofor	lb.	.04 1/2	@
Blanc fixe, dry	lb.	.04 1/2	@
pulp	ton	42.50	@45.00
Carbon Black			
Aeroflot arrow	lb.	.08 1/2	@.12
Compressed	lb.	.08 1/2	@.12 1/2
Uncompressed	lb.	.08	@.12
Fumonex	lb.	.06	@.09
Micronex	lb.	.09	@.13
Carrara filler	ton	20.00	@
Chalk	ton	12.00	@
Clay, Blue Ridge, dark	ton		@
Blue Ridge, light	ton		@
China	lb.	.03	@.03 1/2
Dixie	ton		@
Langford	ton		@
Mineral flour (Florida)	ton		@
Perfection	ton	35.00	@
Suprex	ton	10.00	@22.00
Tensulite	ton	25.00	@
Cotton flock, black	lb.	.13	@
light-colored	lb.	.11	@.14
white	lb.	.12	@.26
Glue, high grade	lb.	.24	@.28
low grade	lb.	.21	@.25
Infusorial earth	ton	45.00	@
Mica, amber (fact'y)	ton	100.00	@
Neomerpin, S. A. conc.	lb.	.60	@
Pumice stone, powd.	lb.	.02 1/2	@.04
Rotten stone (bbls.)	lb.	.02 1/2	@.04 1/2
Soap bark	lb.	.14 1/2	@.15
Soapstone	ton	15.00	@22.00
Talc, domestic	ton	25.00	@
French	ton	18.00	@22.00
Pyrex A	ton		@
B	ton		@
Thermatonic carbon	lb.		@
Velvetex	lb.	.04 1/2	@.06
Whiting			
Domestic	100 lbs.	1.00	@
English, clifstone	100 lbs.	1.50	@
Quaker	ton		@
Snow white	ton		@
Sussex	ton		@
Vancollid	ton	27.00	@
Vansulite	ton	26.00	@
Westminster Brand	100 lbs.		@
Witco (e.l.) (fact'y)	ton	20.00	@
Whiting, imp. chalk	100 lbs.	.90	@1.00
Paris White, Eng. Cliff	100 lbs.	1.50	@2.75

New York Quotations

December 26, 1928

Factice—See Rubber Substitutes

Mineral Rubber

Fluxrite (solid)	lb.	\$0.05	@\$0.06
Genasco (fact'y)	ton	50.00	@52.00
Gilsonite (fact'y)	ton	37.14	@39.65
Granulated M. R.	ton		@
Hydrocarbon, hard	ton		@
Hydrocarbon, soft	ton		@
Ohmlac Kapak, M. R.	ton	40.00	@90.00
M-4	ton	175.00	@
Paradura (fact'y)	ton	62.50	@65.00
Pioneer, M. R., solid (fac.)	ton	40.00	@42.00
M. R. granulated	ton	50.00	@52.00
Robertson, M. R., solid (fact'y)	ton	34.00	@80.00
M. R. gran. (fact'y)	ton	38.00	@80.00
Vansul Pure	ton	35.00	@

Oils

Mineral	gal.	.20	@
Kerosene	gal.	.15	@
Rapeseed	gal.	.85	@
Red oil, distilled	lb.	.09 1/2	@.10 1/2
Rubber process	gal.	.25	@
Spindle	gal.	.30	@

Rubber Substitutes or Factice

Black	lb.	.08	@.14
Brown	lb.	.08	@.15
White	lb.	.09	@.16

Softeners

Burgundy pitch	100 lbs.	6.00	@
Atlas	100 lbs.	6.50	@
Corn oil	lb.	.10 1/2	@
Cottonseed oil	lb.	.11	@
Cycline oil	gal.	.28	@.35
Degras	lb.	.03 1/2	@.04 1/2
Fluxrite (fluid)	lb.	.05	@.06
Moldrite	lb.	.07	@.07 1/2
Palm oil (Lago)	lb.	.08 1/2	@
Palm oil (Niger)	lb.	.08 1/2	@
Palm oil (Witeo)	lb.	.11	@
Para-flux	gal.	.17	@
Petrolatum, snow white	lb.	.08 1/2	@.08 1/2
Pigmentar	lb.	.038	@.0446
Pine oil, steam distilled	gal.	.63	@.64
Rosin K	bbl.	9.75	@
Rosin oil, compounded	gal.	.36	@
No. 3	gal.	.60	@
No. 556	gal.	.51	@
Rubite	lb.	.10 1/2	@
Rubstack	lb.	.11	@
Shellac, orange	lb.	.70	@

Softeners—(Continued)

Stearax	lb.	\$0.16	@\$0.20
Stearic acid, double pressed	lb.	.18	@.18 1/2
Tackol	lb.	.09	@.15
Tar (retort)	bbl.	12.50	@13.00
Tasco W.S. No. 1	lb.	.06	@
A	lb.	.05	@
Vansulol	lb.	.12 1/2	@
Vantar (Pine Tar)	gal.	.35	@
Waxene	lb.	.30	@.40
Woburn oil	lb.	.05 1/2	@.06

Solvents

Benzol (90%, 7.21 lbs. gal.)	gal.	.28	@
Carbon bisulphide (99.9%, 10.81 lbs. gal.) (drums)	lb.	.05 1/2	@.08
tetrachloride (99.7%, 13.28 lbs. gal.) (drums)	lb.	.06 1/2	@.10
Cyclohexanone	lb.	.60	@
Dip-Sol	gal.	.13	@
Dryoleine	gal.	.11 1/2	@
Gasoline			
No. 303			
Tankcars	gal.	.15	@
Drums, c. l.	gal.	.31	@
Drums, l. c. l.	gal.	.36	@
Hexalin	lb.	.60	@
acetate	lb.	.70	@
Rubberlene	gal.	.11 1/2	@
Rub-Sol	gal.	.11	@
Solvent naphtha	gal.	.35	@
Stod-Sol	gal.	.11	@
Sweet rubber cement			
naphtha	gal.	.16 1/2	@
Turpentine, Venice	lb.	.20	@
steam distilled	gal.	.58	@.59

Vulcanizing Ingredients

Sulphur			
Velvet flour (240 lb. bbls.)	100 lbs.	2.95	@3.50
(150 lb. bags)	100 lbs.	2.60	@3.15
Soft rubber (c.l.)	100 lbs.	2.40	@2.75
(l.c.l.)	100 lbs.		@
Superfine commercial flour			
(210 lb. bbls.)	100 lbs.	2.55	@3.10
(100 lb. bags)	100 lbs.	2.40	@2.80
Tire brand, superfine	100 lbs.	1.90	@2.25
Tube brand, velvet	100 lbs.	2.40	@2.75
Sulphur chloride	lb.	.03 1/2	@.03 1/2
Valdex (selenium)	lb.		@

(See also Colors—Antimony)

Waxes

Beeswax, white, com.	lb.	.55	@
carnauba	lb.	.33	@
ceresine, white	lb.	.12 1/2	@
montan	lb.	.07 1/2	@
ozokerite, black	lb.	.27	@
green	lb.	.58	@
Paraffin			
122/124 white crude scale	lb.	.06	@
124/126 white crude scale	lb.	.06	@
120/122 fully refined	lb.	.07 1/2	@
125/127 fully refined	lb.	.07 1/2	@

National Safety Council Elects Officers

At the recent annual congress of the National Safety Council, 108 E. Ohio St., Chicago, Ill., which was held in New York City, the following officers were elected.

Chairman, M. A. Quirk, U. S. Rubber Co., Detroit plant, Detroit, Mich.; vice chairman, E. R. Lawler, U. S. Rubber Co., Hartford plant, Hartford, Conn., Paul Van Cleef, Van Cleef Bros., Chicago, Ill.; E. A. Hoener, The Firestone Tire & Rubber Co., Akron, O.; secretary and chairman publicity, S. Mansfield, The Goodyear Tire & Rubber Co., Akron, O.; chairmen poster and slide committee, J. Kidney, The Goodyear Tire & Rubber Co., Akron, O.; R. Cochran, Kelly-Springfield Tire Co., Cumberland, Md. Chairmen program committee, H. Kunze, The Rubber Association of America; G. Ott, Seiberling Rubber Co., Akron, O.; news letter editor, J. E. Lynch, Fisk Rubber Co., Chicopee Falls, Mass.; chairman membership committee, P. M. Wooden, Mansfield Tire & Rubber Co., Mansfield, O.; chairman statistical committee,

Howard W. Low, The Miller Rubber Co., Akron, O.; chairman health committee, L. J. Healy, The Fisk Rubber Co., federal division, Cudahy, Wis.; chairman engineering committee, C. E. Hungerford, The Firestone Tire & Rubber Co., Akron, O.; chairman rubber section safety contest, E. W. Beck, U. S. Rubber Co., New York, N. Y. Advisory committee, W. L. Schneider, The B. F. Goodrich Co., Akron, O.; R. C. Salisbury, The Fisk Rubber Co., Federal Division, Cudahy, Wis.; E. W. Beck, U. S. Rubber Co., New York, N. Y.; H. T. Martin, The Fisk Rubber Co., Chicopee Falls, Mass.

Criminal Prosecution Against Patent Violators

A decision, handed down recently by District Judge Wham of the Northern Illinois District Court, establishes a precedent in actions against patent violators. This decision sustains an indictment against certain defendants charged with counterfeiting a tire gage manufactured by A. Schrader's Sons, Inc., of Brooklyn, N. Y.

A civil action to recover damages has hitherto been the only legal recourse, but

the new ruling, under the Criminal Conspiracy Act, Section 37, of the United States Code, provides a \$10,000 fine or imprisonment, or both.

Hinchcliffe Tire Identified

It has been reasonably established that the tire washed ashore near Donegal, Ireland, was part of the equipment of the plane in which Captain Walter Hinchcliffe and Lady Elsie Mackay made their ill-fated attempt to cross the Atlantic last March.

Through the serial number, officials of The B. F. Goodrich Co. traced the tire to the Stinson-Detroit Co. who used it to equip a monoplane which was shipped to England last January. Hinchcliffe's flight was made in a Stinson-Detroit and records show that his plane was the only transatlantic plane lost which carried just that size tire of Goodrich make. The serial number was plainly visible on the casing when the tire was found.

THE FIRST LECTURE IN A SHORT SERIES on rubber technology was delivered by F. H. Cotton at the Northern Polytechnic, Holloway, London, N., on Oct. 17. It is planned to give ten lectures in all.

COTTON AND FABRICS

AMERICAN COTTON. The price of middling spot cotton on December was 20.60 cents compared with 19.50 cents on November 1. On December 8 the price had declined to 20 cents. In the following week the price rose to the level of 20.60 cents. In the week ended December 20 the price ranged between 20.55 cents early in the week to 20.40 cents at the close. High and low from the first to the twenty-second of the month was 20.60 cents high and 20.35 cents low.

The final and last Government crop estimate of December 8 placed the 1928 crop at 14,373,000 bales or about 240,000 bales above the November 1 indication. This report caused a sharp decline in the market to 20 cents for spot, however the decline was recovered later the day following. On December 24 spot middlings closed at 20.55 cents.

EGYPTIAN COTTON. In Egypt the Sakel situation is attracting a great deal of attention as exports throughout the balance of the season will have to be reduced below the exports of similar period last year unless the stock is to be entirely cleared out by September 1, 1929. There is no

doubt that prevailing prices are making business in 1½ inch cottons both slow and difficult, as the Sudan crop which promises to be larger than a year ago will come on the market at the end of the winter and may afford some relief.

The high prices of Sakels and other extra staples has had a stimulating effect on the consumption of Uppers and American staples and the exports of Uppers from Egypt have been unusually heavy thus far this season. The basis on American staples is also somewhat firmer, particularly in the better grades although supplies are still large owing to the bountiful crop.

ARIZONA COTTON. The Arizona Pima crop is disappearing very rapidly. Strong staple cotton is now scarce owing to the frosts which have softened the staple in all cottons remaining unpicked.

Cotton Fabrics

DUCKS, DRILLS AND OSNABURGS. The market continues active and the outlook encouraging.

RAINCOAT FABRICS. The raincoat trade is very quiet at the present time due to the fact that all orders are filed for the

holiday trade. Between inventory and work on new lines for spring trade no large volume of business is expected before the middle of January.

SHEETINGS. There are practically no developments to report on the market for sheetings. There is only a scattered amount of buying and prices remain firm.

TIRE FABRICS. There was some buying of tire fabrics early in December but trade soon quieted down and will remain so until the opening of the new year. The day by day activity was very moderate, orders were few and inquiry light. The fabric mills are reported sold ahead for about 60 days only.

The consumption of tire fabric for 10 months ended October 31 was 189,833,418 pounds as compared with 177,979,818 pounds for the same period in 1927. These totals are estimated to represent 75 per cent of the consuming industry.

Rubber Clothing in Brazil

Raincoats in Brazil are supplied by local, English, and French makers. The cravenette or gabardine type is popular for winter wear and retails from \$24 to \$48; while for summer wear a lightweight rubberized fabric is favored, selling from \$12 to \$24.

Drills

38-inch 2.00-yard.....yard	\$0.17¼ @
40-inch 3.47-yard.....	.10¾ @
50-inch 1.52-yard.....	.24¾ @
52-inch 1.90-yard.....	.19¾ @
52-inch 2.20-yard.....	.17¼ @
59-inch 1.85-yard.....	.20¾ @

Ducks

38-inch 2.00-yard S. F.....	.19 @
40-inch 1.45-yard S. F.....	.23¾ @
72-inch 1.05-yard D. F.....	.38¾ @
72-inch 16.66-ounce.....	@
72-inch 17.21-ounce.....	@

MECHANICAL

Hose and belting.....pound	.37¾ @
Specials.....	.40¾ @

TENNIS

52-inch 1.35-yard.....yard	.27¾ @
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Hollands

R.T.5—30-inch.....yard	.16 @
R.T.7—36-inch.....	.18 @
R.T.8—40-inch.....	.20 @

RED SEAL

36-inch.....	.15½ @
40-inch.....	.16½ @
50-inch.....	.25 @

GOLD SEAL

40-inch, No. 72.....	.20¾ @
40-inch, No. 80.....	.22 @

New York Quotations

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Osnaburges

40-inch 2.35-yard.....yard	\$0.15¼ @
40-inch 2.48-yard.....	.14¾ @
40-inch 3.00-yard.....	.12 @
40-inch 10-oz. part waste..lb.	.19¾ @
37-inch 2.42-yard.....	.14¾ @

Raincoat Fabrics

COTTON

Bombazine 64 x 60.....yard	.11 @
Bombazine 60 x 48.....	.10 @
Plaids 60 x 48.....	.12¼ @
Plaids 48 x 48.....	.11 @
Surface prints 64 x 60.....	.13½ @
Surface prints 60 x 48.....	.12¼ @
Print cloth 38½-in., 60 x 48.	.06¾ @
Print cloth, 38½, 64x60....	.07¾ @

Sheetings, 40-inch

48 x 48, 2.50-yard.....yard	.13¾ @
48 x 48, 2.85-yard.....	.11¾ @
64 x 68, 3.15-yard.....	.12¾ @
56 x 60, 3.60-yard.....	.09¾ @
44 x 48, 3.75-yard.....	.08¾ @

Sheetings, 36-inch

48 x 48, 5.00 yard.....yard	.07¾ @
40 x 44, 6.15-yard.....	.05¾ @

Tire Fabrics

-QUARE WOVEN 17½-ounce

Peeler, karded.....pound	\$0.48 @
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BUILDER 23/11

Peeler, karded.....pound	.48 @
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BUILDER 10/5

Peeler, karded.....pound	.45 @
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CORD 23/5/3

Peeler, karded, 1½-in..pound	.48 @
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CORD 23/4/3

Peeler, karded.....pound	.49 @
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CORD 23/3/3

Peeler, karded.....pound	.55 @
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CORD 15/3/3

Peeler, karded.....pound	.46 @
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CORD 13/3/3

Peeler, karded.....pound	.45 @
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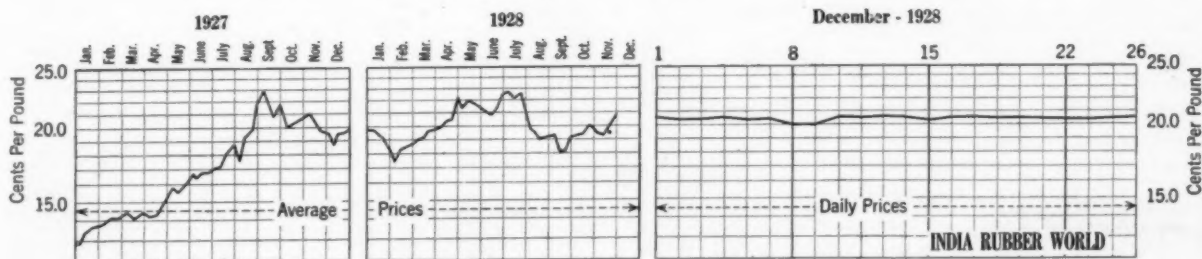
LENO BREAKER

8-oz. Peeler, karded..pound	.49½ @
10-oz. Peeler, karded.....	.49½ @

CHAFER

9.5-oz. Peeler, karded..pound	.51 @
12-oz. Peeler, karded.....	.50 @
14-oz. Peeler, karded.....	.48 @

Ratio Graph of New York Daily Prices of Spot Middling Upland Cotton



United States Statistics

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	September, 1928		Nine Months Ended September, 1928	
	Pounds	Value	Pounds	Value
UNMANUFACTURED—Free				
Crude rubber	88,999,508	\$16,468,231	698,887,795	\$193,955,866
Balata	135,251	38,198	1,789,091	401,645
Jelutong or Pontianak	4,542,862	713,736	13,961,197	2,158,512
Gutta percha	278,800	56,768	2,521,501	587,233
Guayule	867	156	6,891,719	1,755,685
Scrap and reclaimed	1,502,029	48,130	14,690,662	520,676
Totals	95,459,317	\$17,325,219	738,741,965	\$199,379,617
MANUFACTURED—Dutiable				
Chicle	17,566	\$8,719	9,542,521	\$4,870,840
Rubber belting	48,921	\$31,506	401,662	\$227,658
Rubber tires	127	599	4,102	66,879
Other manufactures of rubber		131,226		1,205,025
Totals	49,048	\$163,331	405,764	\$1,499,562

EXPORTS OF FOREIGN MERCHANDISE

RUBBER MANUFACTURES				
Crude rubber	6,804,354	\$1,384,148	54,292,159	\$14,674,281
Balata	54,071	21,426	234,877	90,539
Gutta percha, rubber substitutes and scrap	1,100	214	136,524	17,237
Rubber manufactures		1,015		323,369
Totals	6,859,525	\$1,406,803	54,663,560	\$15,105,426

EXPORTS OF DOMESTIC MERCHANDISE

MANUFACTURED				
Reclaimed	1,813,387	\$128,192	16,425,811	\$1,275,316
Scrap and old	3,734,332	173,097	33,228,730	1,768,485
Rubberized piece goods and hospital sheeting.....sq. yd.	137,892	63,425	1,376,265	674,114
Footwear				
Boots	129,417	298,159	835,777	1,946,764
Shoes	330,469	405,334	1,757,966	1,814,419
Canvas shoes with rubber soles	296,797	184,229	3,980,970	2,800,520
Rubber water bottles and fountain syringes, number	26,738	16,559	264,072	167,379
Rubber gloves.....doz. pairs	5,735	18,468	71,135	202,913
Other druggists' rubber sundries		32,649		308,940
Rubber balloons.....gross	39,091	55,688	421,659	515,628
Rubber toys and balls		13,491		147,865
Bathing caps.....doz.	6,682	18,849	151,193	349,567
Hard rubber goods				
Electrical hard rubber goods	147,367	20,196	1,137,469	234,170
Other hard rubber goods		24,832		253,031
Tires				
Casings, automobile.....number	153,470	1,933,680	1,770,725	22,327,124
Tubes, automobile.....number	114,785	235,358	1,179,802	2,533,105
Other casings and tubes	4,728	12,059	40,807	89,339
Solid tires for automobiles and motor trucks.....number	3,763	123,509	41,361	1,409,394
Others	117,371	26,525	1,393,044	318,239
Tire accessories		103,681		1,241,051
Rubber and friction tape..... ..	100,516	27,902	1,153,622	346,025
Belting	265,151	149,530	3,574,542	2,042,198
Hose	490,399	166,728	3,532,213	1,948,123
Packing	145,957	72,973	2,020,523	918,955
Soles and heels..... ..	85,427	87,774	1,044,160	1,480,387
Thread	104,426	109,216	1,196,583	1,313,829
Rubber bands and erasers	57,274	33,520	665,301	444,728
Other rubber manufactures		163,037		1,891,176
Totals		\$4,698,660		\$50,762,784

Crude Rubber Imports by Customs Districts

	*October, 1928		Ten Months Ended *October, 1928	
	Pounds	Value	Pounds	Value
Massachusetts	2,994,134	\$542,372	33,400,404	\$9,055,117
Buffalo			12,060	2,290
New York	87,209,052	15,967,348	686,041,164	180,046,833
Philadelphia	793,957	148,619	22,107,944	7,425,111
Maryland	2,135,587	512,263	22,744,666	6,856,269
Los Angeles	5,320,929	985,606	28,368,397	7,237,764
San Francisco	103,190	20,661	1,092,538	290,653
Oregon			116,735	35,568
Michigan			33,600	10,080
Ohio	113,637	19,729	2,926,394	930,846
St. Louis			280,000	110,749
Wisconsin			56,090	21,982
Colorado	51,520	9,498	882,320	197,902
Totals	98,722,006	\$18,206,096	798,062,242	\$212,221,164

* Including latex, dry rubber content.

Denmark's Rubber Industry

There were seven rubber factories operating in Denmark in 1927. The average number of workmen was 539 in 1927, 585 in 1926, and 538 in 1925.

Tire Production Statistics

High Pressure Pneumatic Casings

	Cord			Fabric		
	Inventory	Production	Total Shipments	Inventory	Production	Total Shipments
1927	21,527,278	21,733,962		766,581	1,198,549	
1928						
January	3,605,064	1,684,750	1,496,047	200,322	56,218	60,404
February	4,394,561	1,697,498	1,244,812	222,655	53,220	28,719
March	4,355,309	1,564,346	1,302,644	235,673	33,168	28,431
April	4,331,499	1,307,759	1,347,854	223,274	16,198	27,523
May	4,152,775	1,404,097	1,570,710	195,886	6,787	36,567
June	3,362,861	1,345,857	1,812,907	171,349	15,107	38,401
July	3,039,349	1,506,228	2,207,086	113,678	9,285	58,434
August	2,465,358	1,903,345	2,416,386	62,132	20,372	71,856
September	2,339,798	1,853,887	1,990,535	48,011	26,931	41,165
October	2,834,193*	2,035,898	1,596,081	38,934*	15,614	23,426

High Pressure Inner Tubes

	High Pressure Inner Tubes			Balloon Inner Tubes		
	Inventory	Production	Total Shipments	Inventory	Production	Total Shipments
1927	27,398,535	29,528,108		25,718,529	25,143,821	
1928						
January	5,328,071	1,669,894	2,014,744	4,408,235	2,411,124	2,539,535
February	5,941,626	1,949,539	1,470,756	5,046,021	3,221,756	2,602,362
March	6,071,983	1,740,238	1,442,162	5,782,551	3,683,017	2,856,342
April	6,044,843	1,628,576	1,459,826	6,434,307	3,365,957	2,815,778
May	6,220,912	1,680,621	1,713,411	7,055,801	3,695,296	3,011,432
June	5,558,455	1,661,897	2,168,337	7,311,204	3,553,191	3,184,056
July	4,435,798	1,764,761	2,970,017	6,794,803	3,240,455	3,576,465
August	3,833,201	2,783,115	3,357,277	6,614,884	3,474,338	3,655,301
September	3,673,789	2,544,561	2,427,444	6,483,804	2,782,759	2,938,309
October	4,525,109*	2,469,142	1,881,663	6,938,958*	2,727,943	2,365,093

Balloon Casings

	Balloon Casings			Solid and Cushion Tires		
	Inventory	Production	Total Shipments	Inventory	Production	Total Shipments
1927	26,037,452	25,111,903		558,030	558,007	
1928						
January	3,656,537	2,377,299	2,489,391	161,329	36,279	33,797
February	4,173,493	3,021,548	2,500,013	156,790	36,328	38,715
March	4,700,534	3,516,480	2,967,476	156,424	42,950	44,665
April	4,983,023	3,309,351	2,983,454	154,477	43,255	42,145
May	5,419,093	3,658,349	3,235,236	153,205	46,606	47,694
June	5,587,566	3,658,508	3,486,748	153,925	48,614	48,426
July	5,215,331	3,558,203	3,658,636	150,770	45,792	48,081
August	4,986,800	3,678,139	3,814,016	147,350	51,679	52,334
September	4,935,836	3,220,369	3,327,028	150,500	42,619	43,965
October	5,767,229*	3,443,334	2,668,049	153,126*	46,590	45,044

Cotton and Rubber Consumption

Casings, Tubes, Solid and Cushion Tires

	Cotton Fabric Pounds		Crude Rubber Pounds	
	Inventory	Production	Inventory	Production
1927	177,979,818		463,661,466	
1928				
January		16,039,819		43,709,438
February		16,923,607		46,468,050
March		18,853,824		48,897,275
April		18,310,791		43,700,630
May		19,167,606		51,061,030
June		19,646,494		53,158,592
July		20,947,405		47,128,308
August		21,853,756		62,224,046
September		17,796,599		55,351,235
October		20,294,517		58,301,907

*As of October 31, 1928.

Rubber Association figures representing 75 per cent of the industry.

Ceylon Rubber Exports

January 1 to September 30, 1928

	Tons
To United Kingdom	9,211.50
Continent	3,205.45
Australia	758.54
America	23,854.03
Egypt	11.00
Africa	18.23
India	18.35
Japan	85.99
Other countries in Asia	6.60

Total	37,169.69
For the same period last year	41,610.71

Annual Exports, 1921-1927

	Tons
For the year 1927	55,355.77
1926	58,799.56
1925	45,697.19
1924	37,351.13
1923	37,111.88
1922	47,367.14
1921	40,210.31

United Kingdom Statistics

IMPORTS

UNMANUFACTURED Crude Rubber From—	October, 1928		Ten Months Ended October, 1928	
	Pounds	Value	Pounds	Value
Straits Settlements	8,297,800	£305,361	73,602,400	£3,559,565
Federated Malay States...	2,584,800	96,381	36,409,700	1,750,198
British India	407,500	14,096	10,968,300	581,378
Ceylon and Dependencies...	1,659,200	62,553	24,573,000	1,222,341
Other Dutch possessions in Indian Seas	1,106,200	41,044	19,858,000	1,012,308
Dutch East Indies (except Other Dutch possessions in Indian Seas)	1,223,900	45,446	21,822,300	1,103,773
Other countries in East In- dies and Pacific not else- where specified	248,900	9,080	2,760,700	136,197
Brazil	387,200	15,724	4,038,900	195,622
South and Central America (except Brazil) .....	.....	.....	226,200	11,432
West Africa .....	.....	.....	.....	.....
French West Africa...	5,600	162	106,000	4,358
Gold Coast	42,000	1,602	437,100	21,432
Other parts of West Africa	185,800	6,610	1,729,200	78,982
East Africa, including Madagascar	188,200	6,788	1,106,500	54,362
Other countries	163,600	6,582	1,378,900	66,090
Totals	16,500,700	£611,429	199,017,200	£9,798,038
Gutta percha and balata...	223,700	18,531	2,679,300	222,238
Waste and reclaimed rubber...	814,800	8,756	7,415,100	94,286
Rubber substitutes	3,100	68	31,800	961
Totals	17,542,300	£638,784	209,143,400	£10,115,523
MANUFACTURED				
*Tires and tubes	.....	.....	.....	.....
Pneumatic	.....	.....	.....	.....
Outer covers .....	.....	£42,736	.....	£658,215
Inner tubes .....	.....	8,905	.....	128,145
Solid tires .....	.....	11,577	.....	68,805
Boots and shoes...dos. pairs	49,471	177,153	692,456	1,395,063
Other rubber manufactures..	.....	130,682	.....	1,472,302
Totals .....	.....	£371,053	.....	£3,722,535

EXPORTS

UNMANUFACTURED				
Waste and reclaimed rubber...	3,755,500	£21,412	26,374,600	£197,428
Rubber substitutes	50,900	1,177	475,100	11,394
Totals	3,806,400	£22,589	26,849,700	£208,822
MANUFACTURED				
*Tires and tubes	.....	.....	.....	.....
Pneumatic	.....	.....	.....	.....
Outer covers .....	.....	£281,569	.....	£2,206,369
Inner tubes .....	.....	52,495	.....	192,287
Solid tires .....	.....	19,124	.....	128,451
Boots and shoes...dos. pairs	24,231	42,570	228,451	373,968
Other rubber manufactures..	.....	240,342	.....	2,530,349
Totals .....	.....	£636,100	.....	£5,702,640

EXPORTS—COLONIAL AND FOREIGN

UNMANUFACTURED				
Crude Rubber	.....	.....	.....	.....
To—	.....	.....	.....	.....
Russia .....	.....	.....	7,424,400	£491,931
Sweden, Norway and Den- mark	322,200	£17,611	2,688,800	164,010
Germany	2,839,500	111,071	31,229,700	1,733,683
Belgium	560,500	23,386	7,731,200	431,937
France	2,444,900	93,770	30,026,600	1,551,350
Spain	147,900	6,259	1,678,200	108,578
Italy	1,312,900	51,177	14,028,300	719,969
Other European countries...	337,900	17,680	3,941,900	265,769
United States	10,485,000	391,551	99,802,700	5,719,870
Canada .....	.....	.....	71,100	3,106
Other countries	141,800	9,354	1,404,800	101,850
Totals	18,592,600	£721,859	200,027,700	£11,292,053
Gutta percha and balata....	66,100	4,340	691,500	51,643
Waste and reclaimed rubber..	11,400	327	222,200	4,498
Rubber substitutes	800	18	4,500	212
Totals	18,670,900	£726,544	200,945,900	£11,348,406
MANUFACTURED				
*Tires and tubes	.....	.....	.....	.....
Pneumatic	.....	.....	.....	.....
Outer covers .....	.....	£15,525	.....	£133,252
Inner tubes .....	.....	5,133	.....	27,843
Solid tires .....	.....	465	.....	3,343
Boots and shoes...dos. pairs	738	2,107	11,325	21,417
Other rubber manufactures..	.....	8,675	.....	109,843
Totals .....	.....	£31,905	.....	£295,698

*After April 12, 1927, tires and tubes imported or exported with complete vehicles or chassis, or fitted to wheels imported separately, are included under complete vehicles or parts.

†Motor cars, motorcycles, parts and accessories, liable to duty from September 29, 1915, until August 1, 1924, inclusive, and after July 1, 1925, Commercial vehicles, parts and accessories were exempt from duty until April 30, 1926, inclusive, and rubber tires and tubes until April 11, 1927, inclusive.

‡Tires and tubes included prior to April 12, 1927.

Dominion of Canada Statistics

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

UNMANUFACTURED	September, 1928		Six Months Ended September, 1928	
	Pounds	Value	Pounds	Value
Rubber, gutta percha, etc...	6,294,687	\$1,383,904	32,837,978	\$7,998,857
Rubber recovered	1,453,100	103,642	8,391,500	602,983
Rubber and gutta percha scrap	446,200	16,312	3,961,100	171,985
Balata .....	.....	.....	1,070	386
Rubber substitutes	194,900	27,944	451,600	75,536
Totals	8,388,887	\$1,531,802	45,643,248	\$8,849,747
PARTLY MANUFACTURED				
Hard rubber sheets and rods	11,120	\$4,429	91,881	\$31,993
Hard rubber tubes .....	.....	429	.....	8,169
Rubber thread not covered..	16,513	17,602	101,959	113,851
Totals	27,633	\$22,460	193,840	\$154,013
MANUFACTURED				
Belting .....	.....	\$16,589	.....	\$98,580
Hose .....	.....	23,443	.....	133,280
Packing .....	.....	3,250	.....	30,009
Boots and shoes...pairs	16,374	22,222	51,594	53,356
Clothing, including water- proofed .....	.....	45,762	.....	320,678
Gloves .....	.....	1,048	.....	8,419
Hot water bottles .....	.....	5,640	.....	16,873
Tires, solid	58	2,537	476	21,092
Tires, pneumatic	1,364	19,658	24,139	147,807
Tires, tubes	571	1,903	19,915	27,782
Mats and matting .....	.....	9,987	.....	68,075
Cement .....	.....	3,104	.....	29,270
Golf balls	1,115	5,233	23,601	94,476
Heels rubber	161,310	8,966	873,268	51,251
Other rubber manufactures..	.....	112,216	.....	770,114
Totals .....	.....	\$281,558	.....	\$1,861,062
Totals, rubber imports..	.....	\$1,835,820	.....	\$10,864,822

EXPORTS OF DOMESTIC AND FOREIGN RUBBER GOODS

UNMANUFACTURED	Produce of Canada		Re-exports of For- eign Goods	
	Value	Value	Value	Value
Waste rubber	\$23,446	.....	\$111,808	.....
Totals	\$23,446	.....	\$111,808	.....
MANUFACTURED				
Belting	\$31,965	.....	\$258,144	.....
Canvas shoes with rubber soles	351,001	.....	2,707,402	.....
Boots and shoes	394,060	.....	1,595,565	.....
Clothing, including water- proofed .....	.....	1,181	15,478	.....
Hose .....	.....	22,131	129,150	.....
Tires, casings	1,097,393	.....	7,667,023	.....
Inner tubes	160,369	.....	1,216,375	.....
Solid	37,722	.....	189,867	.....
Other rubber manufactures..	108,285	\$2,094	593,488	\$35,551
Totals	\$2,204,107	\$2,094	\$14,372,492	\$35,551
Totals, rubber exports..	\$2,227,553	\$2,094	\$14,484,300	\$35,551

Plantation Rubber Exports from Malaya*

To	January 1 to September 30, 1928		
	From Singapore Tons	From Penang Tons	From Malacca Tons
United Kingdom	4,028.69	4,760.91	4,028.30
British Possessions	2,461.77	187.00	280.00
Continent of Europe	8,492.80	1,499.67	2,271.11
United States	111,197.35	19,639.49	7,583.09
Japan	12,844.00	1,775.50	1,295.00
Other countries	262.83	.....	.....
Totals	139,287.44	27,862.57	15,457.50

*Excluding all foreign transshipment.

London Stocks, October, 1928

	Landed for Oct.		Stocked October 31		
	Tons	Tons	1928 Tons	1927 Tons	1926 Tons
LONDON	.....	.....	.....	.....	.....
Plantation	4,329	11,551	24,112	69,390	41,962
Other grades	5	1	79	120	113
LIVERPOOL	.....	.....	.....	.....	.....
Plantation	739	1579	2,393	73,015	11,468
Total tons, London and Liverpool	5,073	12,131	26,584	72,525	43,543

†Official returns from the seven recognized public warehouses.

Crude Rubber Arrivals at New York as Reported by Importers

Plantations		CASES	
Nov. 15. By "Trier," Far East.			
General Rubber Co.	1,213		
Nov. 16. By "City of Dalhart," Far East.			
The Meyer & Brown Corp.	560		
Chas. T. Wilson Co., Inc.	277		
Nov. 16. By "Mahrona," Far East.			
H. A. Astlett & Co.	330		
General Rubber Co.	209		
The Meyer & Brown Corp.	648		
Poel & Kelly, Inc.	100		
Chas. T. Wilson Co., Inc.	194		
Nov. 16. By "Phemius," Far East.			
H. A. Astlett & Co.	185		
Baird Rubber & Trading Co., Inc.	150		
Bierrie & Co., Inc.	50		
General Rubber Co.	1,593		
Haldane & Co., Inc.	270		
Lavino American & Asiatic Co.	253		
Littlejohn & Co., Inc.	438		
The Meyer & Brown Corp.	883		
H. Muehlstein & Co., Inc.	1,100		
Poel & Kelly, Inc.	545		
Raw Products Co.	550		
Rogers Brown & Crocker Bros., Inc.	150		
Chas. T. Wilson Co., Inc.	230		
Nov. 17. By "Silverash," Far East.			
H. A. Astlett & Co.	2,832		
Robert Badenhop Corp.	408		
General Rubber Co.	3,198		
Haldane & Co., Inc.	985		
Lavino American & Asiatic Co.	1,365		
Littlejohn & Co., Inc.	1,314		
The Meyer & Brown Corp.	2,144		
The Meyer & Brown Corp.	*295		
Poel & Kelly, Inc.	900		
Rogers Brown & Crocker Bros., Inc.	1,086		
Chas. T. Wilson Co., Inc.	379		
Nov. 18. By "Pres. Pierce," Far East.			
The Meyer & Brown Corp.	*1110		
Poel & Kelly, Inc.	*250		
Nov. 18. By "Silverspruce," Far East.			
The Meyer & Brown Corp.	*585		
Poel & Kelly, Inc.	250		
Nov. 19. By "City of Hereford," Far East.			
General Rubber Co.	262		
Littlejohn & Co., Inc.	592		
The Meyer & Brown Corp.	168		
Poel & Kelly, Inc.	100		
Chas. T. Wilson Co., Inc.	505		
Nov. 19. By "Rhesus," Far East.			
H. A. Astlett & Co.	967		
Robert Badenhop Corp.	232		
Baird Rubber & Trading Co., Inc.	300		
Bierrie & Co., Inc.	160		
General Rubber Co.	3,161		
Haldane & Co., Inc.	167		
Lavino American & Asiatic Co.	190		
Littlejohn & Co., Inc.	2,294		
The Meyer & Brown Corp.	137		
H. Muehlstein & Co., Inc.	105		
Poel & Kelly, Inc.	406		
Raw Products Co.	35		
Rogers Brown & Crocker Bros., Inc.	134		
Chas. T. Wilson Co., Inc.	178		
Nov. 19. By "Steel Seafarer," Far East.			
H. A. Astlett & Co.	366		
Robert Badenhop Corp.	50		
General Rubber Co.	6,002		
Haldane & Co., Inc.	250		
Lavino American & Asiatic Co.	339		
Littlejohn & Co., Inc.	806		
The Meyer & Brown Corp.	760		
H. Muehlstein & Co., Inc.	309		
Poel & Kelly, Inc.	667		
Rogers Brown & Crocker Bros., Inc.	155		
Nov. 20. By "American Banker," London.			
Bierrie & Co., Inc.	137		
Nov. 20. By "Minnekahda," London.			
Bierrie & Co., Inc.	157		
General Rubber Co.	30		
Haldane & Co., Inc.	56		
H. Muehlstein & Co., Inc.	500		
Rogers Brown & Crocker Bros., Inc.	264		
Nov. 20. By "New York," Europe.			
General Rubber Co.	700		
Nov. 21. By "Laconia," London.			
Bierrie & Co., Inc.	72		
Nov. 21. By "Oder," Far East.			
General Rubber Co.	250		
Nov. 22. By "Binnendyk," Europe.			
Hood Rubber Co.	*640		
Nov. 22. By "Javanese Prince," Far East.			
H. A. Astlett & Co.	906		
Robert Badenhop Corp.	110		
Baird Rubber & Trading Co., Inc.	300		
General Rubber Co.	1,747		
Haldane & Co., Inc.	551		
Lavino American & Asiatic Co.	549		
Littlejohn & Co., Inc.	1,340		
The Meyer & Brown Corp.	961		
H. Muehlstein & Co., Inc.	1,700		
Poel & Kelly, Inc.	600		
Poel & Kelly, Inc.	*275		
Rogers Brown & Crocker Bros., Inc.	1,433		
Rogers Brown & Crocker Bros., Inc.	*100		
Chas. T. Wilson Co., Inc.	586		
Nov. 23. By "Marengo," Far East.			
Bierrie & Co., Inc.	206		
General Rubber Co.	3,011		
Poel & Kelly, Inc.	157		
Nov. 24. By "Buitenzorg," Far East.			
H. A. Astlett & Co.	1,594		
Robert Badenhop Corp.	739		
Baird Rubber & Trading Co., Inc.	75		
Bierrie & Co., Inc.	453		
General Rubber Co.	3,315		
Haldane & Co., Inc.	407		
Lavino American & Asiatic Co.	287		
Littlejohn & Co., Inc.	2,243		
The Meyer & Brown Corp.	243		
The Meyer & Brown Corp.	*153		
H. Muehlstein & Co., Inc.	1,650		
Poel & Kelly, Inc.	351		
Raw Products Co.	102		
Rogers Brown & Crocker Bros., Inc.	337		
Rogers Brown & Crocker Bros., Inc.	*56		
Chas. T. Wilson Co., Inc.	849		
Nov. 25. By "Toledo," Far East.			
H. A. Astlett & Co.	1,545		
Robert Badenhop Corp.	55		
Baird Rubber & Trading Co., Inc.	165		
Bierrie & Co., Inc.	134		
N. Diamond & Co., Inc.	134		
General Rubber Co.	5,629		
Haldane & Co., Inc.	247		
Lavino American & Asiatic Co.	110		
Littlejohn & Co., Inc.	777		
The Meyer & Brown Corp.	780		
H. Muehlstein & Co., Inc.	130		
Poel & Kelly, Inc.	495		
Rogers Brown & Crocker Bros., Inc.	498		
Rogers Brown & Crocker Bros., Inc.	*230		
Chas. T. Wilson Co., Inc.	690		
Nov. 26. By "London Mariner," London.			
Bierrie & Co., Inc.	206		
The Meyer & Brown Corp.	542		
Nov. 26. By "Minnewaska," Europe.			
Bierrie & Co., Inc.	156		
Littlejohn & Co., Inc.	317		
Poel & Kelly, Inc.	532		
Chas. T. Wilson Co., Inc.	137		
Nov. 27. By "Pres. Hayes," Far East.			
H. A. Astlett & Co.	1,264		
General Rubber Co.	1,375		
Haldane & Co., Inc.	350		
Lavino American & Asiatic Co.	540		
Littlejohn & Co., Inc.	2,380		
The Meyer & Brown Corp.	1,895		
Poel & Kelly, Inc.	660		
Poel & Kelly, Inc.	*300		
Rogers Brown & Crocker Bros., Inc.	335		
Chas. T. Wilson Co., Inc.	42		
Nov. 27. By "Tenyo Maru," Europe.			
Littlejohn & Co., Inc.	*30		
Nov. 28. By "Alaunia," Europe.			
H. A. Astlett & Co.	263		
Bierrie & Co., Inc.	205		
Littlejohn & Co., Inc.	270		
Poel & Kelly, Inc.	812		
Rogers Brown & Crocker Bros., Inc.	314		
Nov. 28. By "American Merchant," London.			
Bierrie & Co., Inc.	301		
Poel & Kelly, Inc.	270		
Nov. 28. By "Pres. Taft," Far East.			
H. A. Astlett & Co.	1,460		
Robert Badenhop Corp.	420		
General Rubber Co.	500		
Littlejohn & Co., Inc.	*2,147		
The Meyer & Brown Corp.	*253		
Nov. 28. By "Westerdyk," Europe.			
Poel & Kelly, Inc.	523		
Nov. 29. By "Mississippi," Europe.			
Littlejohn & Co., Inc.	793		
Dec. 1. By "Innoko," London.			
Rogers Brown & Crocker Bros., Inc.	266		
Dec. 3. By "Roseric," Far East.			
Bierrie & Co., Inc.	80		
General Rubber Co.	212		
Littlejohn & Co., Inc.	320		
Dec. 4. By "American Trader," London.			
Bierrie & Co., Inc.	163		
H. Muehlstein & Co., Inc.	250		
Dec. 4. By "Bintang," Far East.			
H. A. Astlett & Co.	1890		
General Rubber Co.	1562		
Dec. 5. By "Boschdyk," Far East.			
H. A. Astlett & Co.	1,491		
Robert Badenhop Corp.	10		
Baird Rubber & Trading Co., Inc.	230		
Bierrie & Co., Inc.	329		
N. Diamond & Co., Inc.	56		
General Rubber Co.	5,062		
Haldane & Co., Inc.	237		
Lavino American & Asiatic Co.	471		
Littlejohn & Co., Inc.	1,343		
The Meyer & Brown Corp.	694		
The Meyer & Brown Corp.	*51		
H. Muehlstein & Co., Inc.	100		
Poel & Kelly, Inc.	334		
Rogers Brown & Crocker Bros., Inc.	697		
Rogers Brown & Crocker Bros., Inc.	*50		
Chas. T. Wilson Co., Inc.	287		
Dec. 5. By "Minnesota," Far East.			
Lavino American & Asiatic Co.	207		
Dec. 5. By "Tuscania," London.			
Bierrie & Co., Inc.	152		
General Rubber Co.	41		
Poel & Kelly, Inc.	942		
Dec. 7. By "Ala," Far East.			
Hood Rubber Co.	*400		
Dec. 9. By "Median," London.			
Hood Rubber Co.	*130		
Dec. 10. By "City of Wellington," Far East.			
H. A. Astlett & Co.	490		
Robert Badenhop Corp.	350		
N. Diamond & Co., Inc.	63		
General Rubber Co.	2,452		
Haldane & Co., Inc.	235		
Lavino American & Asiatic Co.	110		
Littlejohn & Co., Inc.	1,867		
The Meyer & Brown Corp.	1,745		
The Meyer & Brown Corp.	*50		
H. Muehlstein & Co., Inc.	165		
Poel & Kelly, Inc.	1,035		
Raw Products Co.	50		
Rogers Brown & Crocker Bros., Inc.	570		
Chas. T. Wilson Co., Inc.	270		
Dec. 10. By "Editor," Far East.			
The Meyer & Brown Corp.	630		
H. Muehlstein & Co., Inc.	160		
Dec. 10. By "Minnetonka," London.			
General Rubber Co.	1,199		
H. Muehlstein & Co., Inc.	128		
Rogers Brown & Crocker Bros., Inc.	515		
Dec. 10. By "Pres. Polk," Far East.			
H. A. Astlett & Co.	468		
Bierrie & Co., Inc.	810		
Robert Badenhop Corp.	200		
Baird Rubber & Trading Co., Inc.	1,160		
General Rubber Co.	3,841		
Hood Rubber Co.	43		
Lavino American & Asiatic Co.	180		
Littlejohn & Co., Inc.	1,560		
The Meyer & Brown Corp.	1,896		
Poel & Kelly, Inc.	980		
Rogers Brown & Crocker Bros., Inc.	328		
Chas. T. Wilson Co., Inc.	100		
Dec. 11. By "Luceric," Far East.			
General Rubber Co.	140		
Littlejohn & Co., Inc.	774		
The Meyer & Brown Corp.	320		
Rogers Brown & Crocker Bros., Inc.	140		

* Arrived at Boston.

† Arrived at Los Angeles.

	Cases
Dec. 11. By "Manipur," Far East.	
H. A. Astlett & Co., Inc.	434
Bierrie & Co., Inc.	243
General Rubber Co.	3,795
Littlejohn & Co., Inc.	296
The Meyer & Brown Corp.	112
H. Muehlstein & Co., Inc.	196
Rogers Brown & Crocker Bros., Inc.	705
Chas. T. Wilson Co., Inc.	317
Dec. 11. By "Nortonian," London.	
Hood Rubber Co.	*431
Littlejohn & Co., Inc.	361
H. Muehlstein & Co., Inc.	*256
Poel & Kelly, Inc.	610
Dec. 11. By "Saparoea," Far East.	
H. A. Astlett & Co.	1,967
Robert Badenhop Corp.	198
Baird Rubber & Trading Co., Inc.	75
Bierrie & Co., Inc.	327
N. Diamond & Co., Inc.	249
General Rubber Co.	5,222
Haldane & Co., Inc.	649
Lavino American & Asiatic Co.	310
Littlejohn & Co., Inc.	687
The Meyer & Brown Corp.	271
H. Muehlstein & Co., Inc.	136
Poel & Kelly, Inc.	259
Raw Products Co.	134
Chas. T. Wilson Co., Inc.	236
Dec. 12. By "London Merchant," London.	
Bierrie & Co., Inc.	144
Dec. 13. By "City of Dunkirk," Far East.	
H. A. Astlett & Co.	350
Bierrie & Co., Inc.	140
General Rubber Co.	1,913
Littlejohn & Co., Inc.	2,574
The Meyer & Brown Corp.	2,543
Rogers Brown & Crocker Bros., Inc.	50
Chas. T. Wilson Co., Inc.	1,407

	Cases
Dec. 13. By "Korea Maru," Far East.	
H. A. Astlett & Co.	121
Dec. 14. By "City of Manila," Far East.	
Hood Rubber Co.	*127
Dec. 14. By "Japanese Prince," Far East.	
Robert Badenhop Corp.	1,860
Baird Rubber & Trading Co., Inc.	2,716
N. Diamond & Co., Inc.	53
Haldane & Co., Inc.	551
Hood Rubber Co.	*67
Littlejohn & Co., Inc.	5,735
The Meyer & Brown Corp.	3,859
H. Muehlstein & Co., Inc.	828
Poel & Kelly, Inc.	440
Rogers Brown & Crocker Bros., Inc.	*84
Dec. 15. By "Agapenor," Far East.	
Robert Badenhop Corp.	985
Baird Rubber & Trading Co., Inc.	670
Lavino American & Asiatic Co.	60
Littlejohn & Co., Inc.	4,909
The Meyer & Brown Corp.	4,967
H. Muehlstein & Co., Inc.	500
H. Muehlstein & Co., Inc.	*260
Poel & Kelly, Inc.	1,550
Raw Products Co.	200
Rogers Brown & Crocker Bros., Inc.	1,070
Dec. 15. By "Pres. Jefferson," Far East.	
The Meyer & Brown Corp.	†250
H. Muehlstein & Co., Inc.	†500
Dec. 15. By "Silverguava," Far East.	
Robert Badenhop Corp.	1,115
Baird Rubber & Trading Co., Inc.	400
N. Diamond & Co., Inc.	275
Haldane & Co., Inc.	498

	Cases
Lavino American & Asiatic Co.	425
Littlejohn & Co., Inc.	7,266
The Meyer & Brown Corp.	2,204
H. Muehlstein & Co., Inc.	398
Poel & Kelly, Inc.	910
Rogers Brown & Crocker Bros., Inc.	*200
Rogers Brown & Crocker Bros., Inc.	2,226
Rogers Brown & Crocker Bros., Inc.	*66

Africans

Nov. 22. By "Binnendyk," Europe.	
Hood Rubber Co.	*345
Nov. 26. By "Tomalva," Europe.	
Hood Rubber Co.	*792
Littlejohn & Co., Inc.	19
Dec. 11. By "Burgerdyk," Europe.	
Hood Rubber Co.	*197

Balata

Dec. 1. By "Ardenhall," Brazil.	
Paul Bertuch & Co., Inc.	54
Dec. 11. By "Maraval," Demerara.	
Middleton & Co., Ltd.	22

Rubber Latex

Nov. 17. By "Silverash," Far East.	
General Rubber Co.	154,627
Nov. 19. By "Steel Seafarer," Far East.	
General Rubber Co.	70,160
Dec. 10. By "Pres. Polk," Far East.	
General Rubber Co., Ltd.	37,333

Paras and Caucho

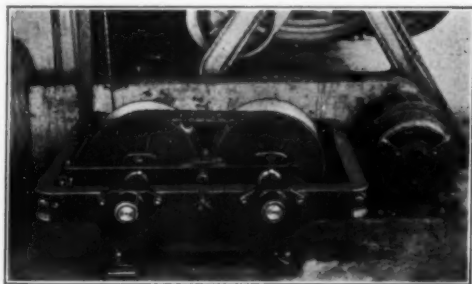
	Fine Cases	Medium Cases	Coarse Cases	Caucho Cases	Miscel. Cases		Fine Cases	Medium Cases	Coarse Cases	Caucho Cases	Miscel. Cases
Nov. 23. By "Denis," South America.						Dec. 12. By "Alban," South America.					
H. A. Astlett & Co.	170		328	90		H. A. Astlett & Co.	111		73	177	
Paul Bertuch & Co., Inc.	364					Paul Bertuch & Co., Inc.	162		12		
General Rubber Co.	396	1	34	11		General Rubber Co.	705	3	95		
Littlejohn & Co., Inc.	349		27			Littlejohn & Co., Inc.	211		19		
Dec. 1. By "Ardenhall," South America.						Dec. 12. By "Barreado," South America.					
H. A. Astlett & Co.	121		635	150		H. A. Astlett & Co.	829		528	146	
Paul Bertuch & Co., Inc.	124					General Rubber Co.					†35
General Rubber Co.	233		63								

*Mixed. †Cameta.

United States Crude and Waste Rubber Imports for 1928 by Months

	Plantations	Paras	Africans	Centrals	Manicobas and Matto	Guayule	Grosso	Total	Balata	Miscellaneous	Waste
								1928	1927		
January	43,668	1,580	433	126	435	1		46,243	45,827	120	1,292
February	27,852	756	125	125	587			29,445	27,701	58	517
March	37,545	2,430	72	92	755			40,894	35,054	154	741
April	36,108	573	15	20	524			37,240	48,632	202	888
May	31,564	849	14	5	451			32,883	36,285	71	923
June	24,752	582	25	9	424			25,792	33,142	14	727
July	32,536	585	11	62	188			33,382	38,416	108	895
August	28,675	1,010	105	15				29,805	32,804	62	775
September	45,663	731	262	6				46,662	32,810	107	961
October	41,571	884	37	23				42,515	31,498	118	785
November	33,771	766	118	65				34,720	40,634	58	737
Total, eleven months, 1928.	383,705	10,746	1,217	548	3,364	1		399,581		1,072	9,241
Total, eleven months, 1927.	379,486	15,419	1,743	1,477	4,647	31		402,803		840	11,919

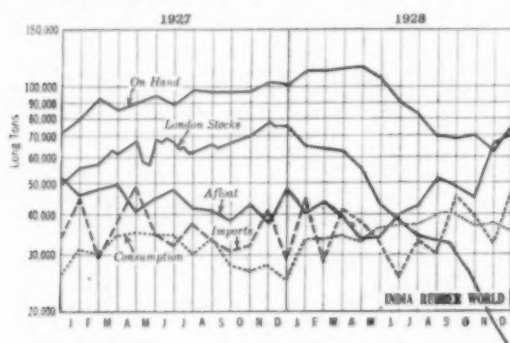
Compiled from statistics supplied by the Rubber Association of America, Inc.



Installation of a Reeves variable speed transmission for driving a belt conveyer at the Firestone Tire & Rubber Co., Akron, O.

Imports, Consumption and Stocks

The accompanying graph covers crude rubber importations, consumption and stocks for 12 months 1927 and 1928. Stocks on hand November 30 were 74,000 tons, an increase of 6,000 tons



U. S. Imports, Consumption and Stocks

over that on October 31. Consumption during November was 37,461 tons, a decline of 3,386 tons from that of October. The estimated consumption for December is placed at 36,000 tons or only 1,461 tons less than it was in November.

London stocks dropped between November 24 and December 1 from 18,724 tons to 16,517 tons. On December 8 and 15 the stock was at 17,669 tons.

Twelve Months	Imports Tons	Consumption Tons	Stocks		Singapore and Penang	
			On Hand Tons	Affort Tons	London Tons	Penang Tons
1925.....	384,837	389,136	51,000*	48,000*	.....	.....
1926.....	411,900	366,140	72,510*	52,019*	.....	.....
1927.....	426,258	370,915	100,130*	47,939*	63,207*	25,868*
1928						
January.....	46,200	34,403	110,114	41,256	66,285	25,868
February.....	29,445	33,703	108,955	43,316	62,500	22,867
March.....	40,894	35,688	114,061	39,324	61,000	20,538
April.....	37,240	32,779	113,800	33,986	55,000	16,946
May.....	32,883	37,333	105,356	34,374	43,716	17,687
June.....	25,792	37,676	90,189	40,000	35,248	18,207
July.....	33,382	37,407	83,242	42,304	35,445	18,663
August.....	29,805	42,925	68,994	51,875	31,884	18,971
September.....	46,662	39,882	68,881	48,566	31,462	14,898
October.....	42,515	40,847	66,421	41,571	24,240	13,251
November.....	34,720	37,461	61,956	68,119	16,517†	.....
Dec. (est.)...	48,000	36,000	74,000	70,000	.....	.....

* December 31.

† December 1.

The 1928 figures, unless otherwise specified, are all as of the first of each month.

Lead Test for Zinc Oxide

Poor quality zinc oxide and lithopone may often darken a vulcanized product through the presence of lead, which on being heated in a sulphur bearing compound forms a lead sulphide. The lead adulterant, it is said, may be easily detected in a compound by moistening some of the latter on a chinaware dish and directing upon it a jet of hydrogen sulphide. If lead be present the pigment will quickly darken. Similarly a dry zinc oxide that darkens when shaken up with dry hydrogen sulphide may be expected to darken when heated with rubber and sulphur.

Chemical Industries Exposition

The Twelfth Exposition of Chemical Industries will be held at Grand Central Palace, New York City, the week of May 6 to 11, 1929. It will bring together between 350 and 450 exhibitors displaying products that include chemical engineering equipment and processes, special machinery, laboratory equipment, chemical products, etc. Information concerning the exposition may be obtained direct from the offices of the exposition at the Grand Central Palace, New York, Charles F. Roth, manager.

World Rubber Production—Net Exports

	Total Jan.-Sept.		Long Tons—1928	
	1927	1928	Oct.	Nov.
British Malaya:				
Gross exports	281,125	249,987	†24,441	68,072
Imports	129,317	115,626	12,603	10,436
Net	151,808	134,361	11,838	57,636
Ceylon	42,012	37,415	3,906	.....
India and Burma	7,847	7,765	864	.....
Sarawak	8,015	7,622	949	772
B. N. Borneo	4,808	4,743	*500	*500
Siam	3,756	3,637	457	425
Java and Madura	41,597	43,483	5,295	.....
Sumatra East Coast	55,595	58,369	7,474	.....
Other N. E. Indies	100,705	92,241	9,977	.....
French Indo-China	5,996	7,354	†† 566	†† 943
Other America	1,598	1,227	.....	.....
Amazon Valley	20,321	15,720	1,399	1,790
Mexican Guayule	3,696	3,076	.....	.....
Africa	6,329	4,444	.....	.....
Totals	454,083	421,457	.....	.....

* Estimated.

† Excluding dry content of concentrated latex.

†† Preliminary statistics.

Compiled by Rubber Division, Department of Commerce, Washington, D. C.

World Rubber Absorption—Net Imports

	Total Jan.-Sept.		Long Tons—1928	
	1927	1928	Sept.	Oct.
Australia	6,504	6,072	603	766
Belgium	4,493	6,079	597	.....
Canada	20,397	22,531	2,810	2,943
Czechoslovakia	1,692	2,338	235	.....
Denmark	426	352	53	.....
Finland	509	569	64	65
France	22,436	25,919	3,524	3,728
Germany	27,373	27,305	3,553	4,386
Italy	7,731	8,899	1,278	.....
Japan	14,270	16,881	1,852	.....
Netherlands	386	1,923	345	141
Norway	479	502	74	.....
Russia	8,250	72	5	.....
Spain	1,388	413	277	.....
Sweden	1,422	1,696	186	272
United Kingdom	52,364	482	4,199	4,934
United States	306,607	288,204	36,797	41,667
U. S. (Guayule)	3,696	3,076	.....	.....
Totals	480,423	413,313	56,452	.....

† Excess of Reexports over Imports.

Compiled by Rubber Division, Department of Commerce, Washington, D. C.

British Malaya

RUBBER EXPORTS

An official cablegram from Singapore to the Malay States Information Agency, Malaya House, 57 Charing Cross, London, S. W. 1, England, states that the amount of rubber exported from British Malaya in November last totaled 68,072 tons. The amount of rubber imported was 10,436 tons of which 7,734 tons were declared as wet rubber. The following are comparative statistics:

	1927		1928	
	Gross Exports Tons	Foreign Imports Tons	Gross Exports Tons	Foreign Imports Tons
January	34,946	14,995	27,731	16,618
February	27,528	11,697	28,813	12,911
March	41,346	17,462	27,813	10,508
April	29,041	13,069	20,029	9,335
May	31,393	15,491	26,403	10,350
June	32,607	14,706	22,930	16,168
July	23,947	12,697	30,405	13,383
August	30,371	17,105	35,593	15,114
September	29,835	12,095	29,700	11,239
October	29,846	15,801	24,441	12,603
November	28,277	19,860	68,072	10,436
Totals	339,137	164,978	341,930	138,665

The above figures represent the totals compiled from declarations received up to the last day of the month for export from and import to all ports of British Malaya and not necessarily the actual quantity shipped or landed during that month.

DISTRIBUTION

The following is a comparative return of distribution of shipments during the months of October and November, 1928.

	Oct. 1928		Nov. 1928	
	Tons	Tons	Tons	Tons
United Kingdom	1,686	13,745	1,686	13,745
United States	17,903	44,905	17,903	44,905
Continent of Europe	1,747	4,902	1,747	4,902
British Possessions	283	1,331	283	1,331
Japan	2,771	3,131	2,771	3,131
Other foreign countries	51	58	51	58
Totals	24,441	68,072	24,441	68,072

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